DEVELOPING PUBLIC PRIVATE PARTNERSHIP STRATEGY FOR INFRASTRUCTURE DELIVERY IN NIGERIA

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ABSTRACT

The success of any public-private partnership (PPP) project in a country is largely dependent on the country's maturity on critical success factors (CSFs) that made PPP projects successful. Thus, identification of metrics and standards for measuring the maturity of stakeholder organisations on CSFs for PPP projects implementation remains a challenge. Though studies on CSFs for PPP projects abound, approaches of using CSFs to develop PPP process maturity received scarce attention. Against this backdrop, this research becomes imperative to create efficient and transparent operational strategies with a view to using CSFs to develop process maturity for stakeholder organisations in PPP projects in Nigeria.

Data for the research were obtained through mixed methods approach namely: quantitative and qualitative approaches. Questionnaires were administered on five different stakeholder organisations comprised public sector authorities (i.e. ministries, department, and agencies), concessionaires, local lenders/banks, consultants, and contractors involved in different PPP projects implementation in Nigeria. The data collected were analysed using descriptive and inferential statistics. Also, the qualitative approach was conducted through an expert forum and six PPP infrastructure project case studies in Lagos metropolis, Nigeria. The expert forum was constituted to refine and verify the conceptual framework developed. Also, structured interviews were conducted with primary stakeholders in the six PPP infrastructure project case studies in the study area.

The research identified fourteen CSFs that made PPP infrastructure projects successful in Nigeria. These CSFs were employed for capability maturity levels definition ranging from level 1(Ad hoc) to level 5(Optimising) in accordance to Capability Maturity Model (CMM) concept. This led to the development of stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects in Nigeria. The framework was validated by PPP experts to ensure it is comprehensive, objective, practical, replicable, reliable, and suitable for use in Nigeria. Thus, a quantitative assessment tool was developed with the framework in assessing the current capability maturity levels of stakeholder organisations involved in PPP infrastructure projects on fourteen CSFs identified in this research. The findings revealed that public sector organisations were between maturity level 1 and maturity level 2 (out of 5 maturity levels) on CSFs applicable to them. The majority of the private sector organisations were in maturity level 2 on CSFs associated with them. It is established in this research that Nigeria's maturity is between maturity level 1 and maturity level 2 (out of 5 maturity levels) on CSFs that made PPP infrastructure projects successful.

The findings emanated from this research provided both the theoretical and practical contributions to knowledge. The theoretical contributions include the methodology for developing capability maturity levels in PPPs, new insights into the usefulness of CSFs in PPP projects, and contributed to the wider body of knowledge of process improvement in the construction industry at large. The practical contributions are the capability level definitions and enhancement framework for PPP practice, and the specific CSFs for PPP infrastructure projects in Nigeria. The framework developed in this research had provided the benchmark for the identification of methodical approach and standard to process improvement in PPP infrastructure projects in Nigeria. It is believed that the framework would provide a useful guide and roadmaps for improvement by indicating 'what' needs to be done by stakeholder organisations involved in PPP projects in achieving higher capability maturity levels on identified CSFs for PPP projects in Nigeria and developing countries at large. Thus, the framework could be used to benchmark future studies.

DEDICATION

This thesis is dedicated to the One I owe it all to- my life, my being, and my salvation- The Lord God Almighty.

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DECLARATION

I declare the following:

That the results contained in this thesis has not been submitted for any other award. Thus, it is the original of my work.

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TABLE OF CONTENTS

LISTS OF TABLES

LISTS OF FIGURES

ACRONYMS AND ABBREVIATIONS

AC- Audit Commission

AfDB- Africa Development Bank

BOO- Build-Own-Operate

BOT-Build-Operate-Transfer

CCPPP- Canadian Council for Public Private Partnerships

CMM- Capability Maturity Model

CSFs- Critical Success Factors

DBFO-Design-Build-Finance-Operate

DBOM- Design-Build-Operate-Maintain

EU- European Union

FGN- Federal Government of Nigeria

FMEA- Failure Mode and Effect Analysis

GDP- Gross Domestic Product

ICRC-Infrastructure Concession Regulatory Commission

IDD- Infrastructure Development Department

IMF- International Monetary Fund

IPPR- Institute for Public Policy Research

LSDPC - Lagos State Development and Property Corporation

MDAs- Ministries, Departments, and Agencies

NBS- National Bureau of Statistics

OECD- Organisation for Economic Co-operation and Development

OGC- Office of Government Commerce

PESTLE- Political, Economic, Social, Technological, Legal, and Environmental

PPP- Public Private Partnership

PSC- Public Sector Comparator

SFs – Success Factors

SPICE- Structured/ Standardised Process Improvement in Construction Enterprises

SSA- Sub Saharan Africa

UN- United Nations

UNECE- United Nations Economic Commission for Europe

VfM- Value for Money

WEF- World Economic Forum

LIST OF PUBLICATIONS

Journal papers (published and accepted)

1. Babatunde, S.O., Perera, S., Udeaja, C. & Zhou, L. (2014), Challenges of implementing infrastructure megaprojects through public-private partnership in Nigeria: a case study of road infrastructure, *International Journal of Architecture, Engineering and Construction,* June, 3(2), pp.142-154.

2. Babatunde, S.O., Perera, S., Zhou, L. & Udeaja, C. (2015), Barriers to public private partnership (PPP) projects in developing countries: a case of Nigeria, *Engineering*, *Construction and Architectural Management* (ECAM) 22(6), pp.669-691.

3. Babatunde, S.O., Perera, S. & Zhou, L. (2016), Methodology for developing capability maturity levels for PPP stakeholders organisations using critical success factors, *Construction Innovation,*16(1), pp.81-110.

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5. Babatunde, S.O., Perera, S. & Zhou, L. (2016), Public-private partnership in university female students' hostel delivery: analysis of users' satisfaction in Nigeria, *Facilities,* awaiting acceptance (after revising the paper according to the minor revisions given).

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6. Babatunde, S.O., Perera, S. & Zhou, L. (2016), Cross-sectional comparison of public-private partnerships in transport infrastructure development in Nigeria, *Engineering*, *Construction and Architectural Management* (ECAM) (under review).

Conference papers (published)

7. Babatunde, S.O., Perera, S., Udeaja, C. & Zhou, L. (2014), Identification of barriers to PPPs implementation in developing countries. In: CIB International Conference on Construction in Changing World, 4-7 May, Heritance Kandalama, Sri Lanka.

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Chapter 1: INTRODUCTION

1.1 Background of the study

Infrastructure has been identified as a catalyst for economic growth. Thus, Public Private Partnership (PPP) is a credible vehicle for the development of the Nation's infrastructure. The involvement of the private sector in the development and financing of public facilities and services has increased substantially over the past decade (Li *et al*., 2005a). PPP forms of procurement are recognised as an effective way of delivering value-for-money in public infrastructure or services (Li *et al*., 2005b). Moreover, PPP seeks to combine the advantages of competitive tendering and flexible negotiation, and also allocate risk on an agreed basis between the public and private sectors (Li *et al*., 2005b). Akintoye *et al*. (2011) assert that PPP is commonly used to accelerate economic growth, development and infrastructure delivery, and to achieve quality service delivery and good governance.

PPP originated in the United Kingdom between the government and merchant banks several centuries ago with the development of mines (Jacoby, 2000). This corroborated by van den Hurk & Liyanage (2013) that PPPs have been in existence in the UK for many decades. The term "PPP" was first used in the USA in the 1960s to refer to typical urban development projects involving private investors (Alfen, 2010). Since 1960s, the PPP concepts spread all over the world in various forms and is becoming increasingly popular both as an alternative procurement option for the public sector and a good investment opportunity for private investors (Alfen, 2010). The forms of PPPs used for the execution of infrastructure projects include build-operate-transfer (BOT), build-transfer-operate (BTO), design-build-finance-operate (DBFO), build-own-operate (BOO), design-build-operate-maintain (DBOM) among others (Zhang & Kumaraswamy, 2001).

Studies have emphasised the importance of infrastructure as an enabler for developing an economy, and the fact is that vast segments of existing infrastructure in the developed world are becoming deficient, and in developing countries existing infrastructure are worrisome. The demand for infrastructure development and the maintenance of existing infrastructure caused by economic growth and population increase has in many instances, overtaken the capacity of national governments to provide the necessary finance (Howes & Robinson, 2005). Many studies have been conducted regarding governments' inability to raise massive funds for large-scale infrastructure projects that can be mitigated by private participation (Cheung *et al*., 2009). For instance, the estimates of investment needs for global

infrastructure development ranges as high as US$3 trillion per year, of which approximately US$1 trillion per annum needs to be spent in developing countries (World Economic Forum, 2010). Estimate for developing the Asian region range from US$1 to US$2 trillion; US$600 billion for Latin America; while Eastern Europe and Africa also need heavy capital infusions for infrastructure development (Howes & Robinson, 2005). The inadequacy of infrastructure in Africa is widely recognised. Particularly, in Sub Saharan Africa (SSA), the finance required to raise infrastructure to a reasonable level within the next decade is estimated at US$93 billion per year (World Bank, 2011a).

Governments in many countries ranging from matured economies to emerging market economies have found partnerships with the private sector as an attractive alternative to increasing and improve the supply of public infrastructure facilities. For instance, International Institute for Sustainable Development (2012) reports that between 1990 and 2009 there are more than 1,300 PPP contracts signed within the European Union, with a combined capital value in excess of €250 billion". The UK, Spain, Germany, Italy, France and Portugal are the main proponents of PPP in Europe, together they account for 92 percent of all PPPs within the period of 1990–2009 (IISD, 2012). The UK is by far the biggest user of PPP with about 871 PPP projects of the total of EU numbers, and Spain is the second with about 130 PPP projects (IISD, 2012). In the United States, there have been 363 funded PPP projects between 1985 and 2010, with a total value in excess of US$59.5 billion (Public Works Financing, 2010). In Australia, PPPs are used for a large slice of the infrastructure market; this is in the range of 10-15 percent in terms of total government procurement (Infrastructure Partnerships Australia, 2007). Also, Australia had more than 127 PPP projects at a combined value of AU$35.6 billion as at 2005 (English, 2006). In Canada, there is a little above 100 PPP projects totalling at US$31 billion total value since 1985 (PWF, 2010). Emerging countries in the Asia-Pacific region and Latin America have continued to drive infrastructure development through PPPs (Alitheia, 2010).

In Nigeria, the state of infrastructure challenge is huge. This becomes acute with the physical infrastructure comprising roads, rails, airports, seaports, power (electricity) among others and the country requires US$10 billion annually for the next ten years to achieve the infrastructure requirements (Sanusi, 2012). Roumboutsos (2015) asserts that the need to deliver transport infrastructure to foster economic requirements and address societal challenges has placed a strain on governmental budgets internationally. Also, the endemic corruption in public procurement has been a subject of debate in recent times. For example,

Wahab (2000) argues that Nigeria is losing an average of US$270 million annually through various kinds of manipulations of the procedure for award and execution of public contracts. These manipulations are in the forms of inflating the contracts costs; use of contracts system to divert public funds to private pockets; and award of contracts without adequate planning and budgetary provisions among others. Unfortunately, Nigerian government budget deficits and the inefficient management of large infrastructure projects and services within the public sector are a few of the reasons why the traditional procurement method of governments funding infrastructure projects through fiscal budgets is increasingly considered unviable (Alitheia, 2010). The Nigerian government in recognition of the massive investment required for infrastructure provision and upgrading necessitated the government to put in place an enabling environment to drive the private sector participation in infrastructure provision (Alli, 2006).

In order to attract private sector finance for infrastructure provision led the Nigerian government established the Infrastructure Concession Regulatory Commission (ICRC) law in 2005 (Ahmed, 2011; World Bank, 2011a). The ICRC law provided the legal and institutional framework for PPPs to operate successfully in the country (Ahmed, 2011). Thus, the recent government agenda indicates that infrastructure development is gaining momentum with up to 51 infrastructure projects were undertaken through PPPs between 1990 and 2009 (Vetiva, 2011). Most of these PPP projects started in the year 2006 with the transport sector being the primary beneficiary, where about 24 PPP projects were undertaken within the sector between 2005 and 2009. In 2013 and 2014, about 66 PPP projects were in the negotiation stage (Infrastructure Concession Regulatory Commission, 2014). This is similar to what is happening in Europe. For instance, Roumboutsos (2015) asserts that the transport sector has taken extensive advantage of the PPP delivery model in Europe.

In a globalising world, there is a considerable interest in identifying CSFs that made PPP projects successful. This triggered a number of researchers toward identifying and assessing CSFs that are responsible for the successful implementation of PPP projects in different countries (see Grant, 1996; Stonehouse *et al*., 1996; Gupta & Narasimham, 1998; Zhang *et al*., 1998; Kanter, 1999; Qiao *et al*., 2001; Jefferies *et al*., 2002; Askar & Gab-Allah, 2002; Li *et al*., 2005c; Zhang, 2005b; Dulaimi *et al*., 2010; Chan *et al*., 2010a; Ismail & Ajija, 2011; Cheung *et al*., 2012a; Babatunde *et al*., 2012; Babatunde *et al*., 2015). Several researchers have also identified means of measuring project success in PPPs (see Liyanage & Villalba-Romero, 2015). In spite of these previous studies, very few attempted using

CSFs to develop a process improvement framework for PPP infrastructure projects implementation. Sarshar *et al*. (2000) advocate for a process improvement framework for the construction industry to meet the targets set by Sir Michael Latham in *Constructing the team* (Latham, 1994). In this regard, a number of maturity models are being developed and applied to project management in the construction industry with a view to improving productivity and attains quality gains, but limited contributions of these maturity models to PPP project implementation. The World Economic Forum (2013) reports that the success of any PPP project is largely dependent on the country's maturity on each CSF that made PPP projects successful. It is against this backdrop that necessitated this study to using CSFs to develop PPP process maturity framework for stakeholder organisations in PPP projects in Nigeria. Currently, no such framework exists in PPP projects implementation in both developed and developing countries, and this development is believed to benefit the construction industry at large, as well as introduce new opportunities.

1.2 Problem statement

Despite the increasing adoption of PPPs, the experiences of many countries are not always positive due to controversies, failures, delays, and revocation of concessions agreement that characterised its successful implementation, particularly in developing countries. This is corroborated by Yang *et al*. (2010) that some infrastructure partnerships between the public and private sectors in the past are yet to provide evidence of successful completion. For instance, the failure of two BOT (Build-Operate-Transfer) projects in Thailand (Ogunlana, 1997). The failure of privatised national sewerage project in Malaysia (Abdul-Aziz, 2001) among others. In Nigeria, PPP which is globally regarded as the panacea for infrastructure deficit has become controversial. This has caused diminishing interests of both the local and foreign private investors. For example, the concession of 105 Km Lagos-Ibadan Expressway which was awarded in 2009 under a BOT model was revoked in November 2012. The concession of Murtala Mohammed Airport Terminal 2 (MMA 2) in Lagos, Nigeria that was commissioned in April 2007 has been enmeshed in controversy till today, over the concession period between the federal government of Nigeria and the concessionaire. Also, the concession of Nnamdi Azikiwe Airport, Abuja was later revoked (Lucas, 2011). The question that agitates mind is why has PPP, which has been successful in the UK, Australia, other developed countries, and emerging market economies such as China, India, South Africa, among others become controversial in Nigeria? These appalling situations have been subjected to the debate by stakeholders, who have expressed worries about the inability of

the government to address the situation. Therefore, there is a need to create efficient and transparent operational strategies to enable PPPs play a vital role in the process. This necessitated this research to critically investigate PPP infrastructure projects implementation in Nigeria.

Moreover, studies on PPP have grown tremendously in the last decades, but the gaps in the earlier studies were identified as follows:

- Stakeholder organisations' maturity on critical success factors (CSFs) for PPP infrastructure projects have not been properly addressed.

- Some maturity models are in existence in the construction industry, but limited applications of these maturity models to PPPs practice improvement.

- Studies on CSFs for PPP projects abound, but approaches of using CSFs to develop PPP process maturity received scant attention.

Being aware of these gaps, this research, therefore, becomes imperative to use CSFs to develop a process maturity framework for stakeholder organisations' in PPP infrastructure projects in Nigeria. This framework would be useful in assessing the current capability maturity level of stakeholder organisations involved in PPP infrastructure projects, and providing a roadmap for continuous improvement to guarantee the long-term success of PPP projects implementation in Nigeria and developing countries at large. In this regard, the following research questions are pertinent:

i. What are the barriers to PPPs infrastructure project implementation?
ii. How can CSFs which are peculiar to the successful realisation and delivering of PPP infrastructure projects be identified?
iii. How can capability maturity level for stakeholder organisations involved in PPP infrastructure projects be determined?

1.3 Aim and Objectives

This research aims to develop a stakeholder organisations' capability enhancement framework (SOCEF) for infrastructure projects utilising public-private partnerships in Nigeria. The objectives are:

1. To explore the development of PPP concepts for infrastructure delivery.

2. To review capability maturity model (CMM) dynamics in the construction industry.
3. To identify and evaluate the drivers and barriers of PPP infrastructure projects implementation in Nigeria.
4. To evaluate success factors applicable for PPP infrastructure projects in Nigeria.
5. To develop a conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria.
6. To determine critical success factors and capability level definitions for stakeholder organisations in PPP infrastructure projects in Nigeria.
7. To develop a final stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects in Nigeria.
8. To validate the developed final framework.

1.4 Research design and methodology employed

In achieving the research aim and objectives, this research employed mixed methods paradigm that combines both the qualitative and quantitative research strategy. These include literature review, questionnaire survey and case studies to develop a richer theoretical perspective (see Figure 1.1 for details). Bryman (2006) supports the mixed methods because it overcomes the weaknesses associated with using only one method and providing scope for a richer approach to data collection; analysis; and interpretation. Robson (1993) states that "if a research approach relied solely on a singular methodological standpoint, some unknown(s) part or aspect of the results obtained would be attributable to the restrictive aspect(s) of the method not used in obtaining such result(s)". Based on the foregoing, it indicates that in order to gain complete understanding of a given construction management research phenomenon, triangulated approaches which typically comprised a blend of methods that are very different from each other should be used (Denzin, 1989; Robson, 1993; Blackwood *et al*., 1997; Love *et al*., 2002; Yin, 2009; Saunder *et al*., 2012). Therefore, Figure 1.1 shows the indicative research methodology employed in this research as follows:

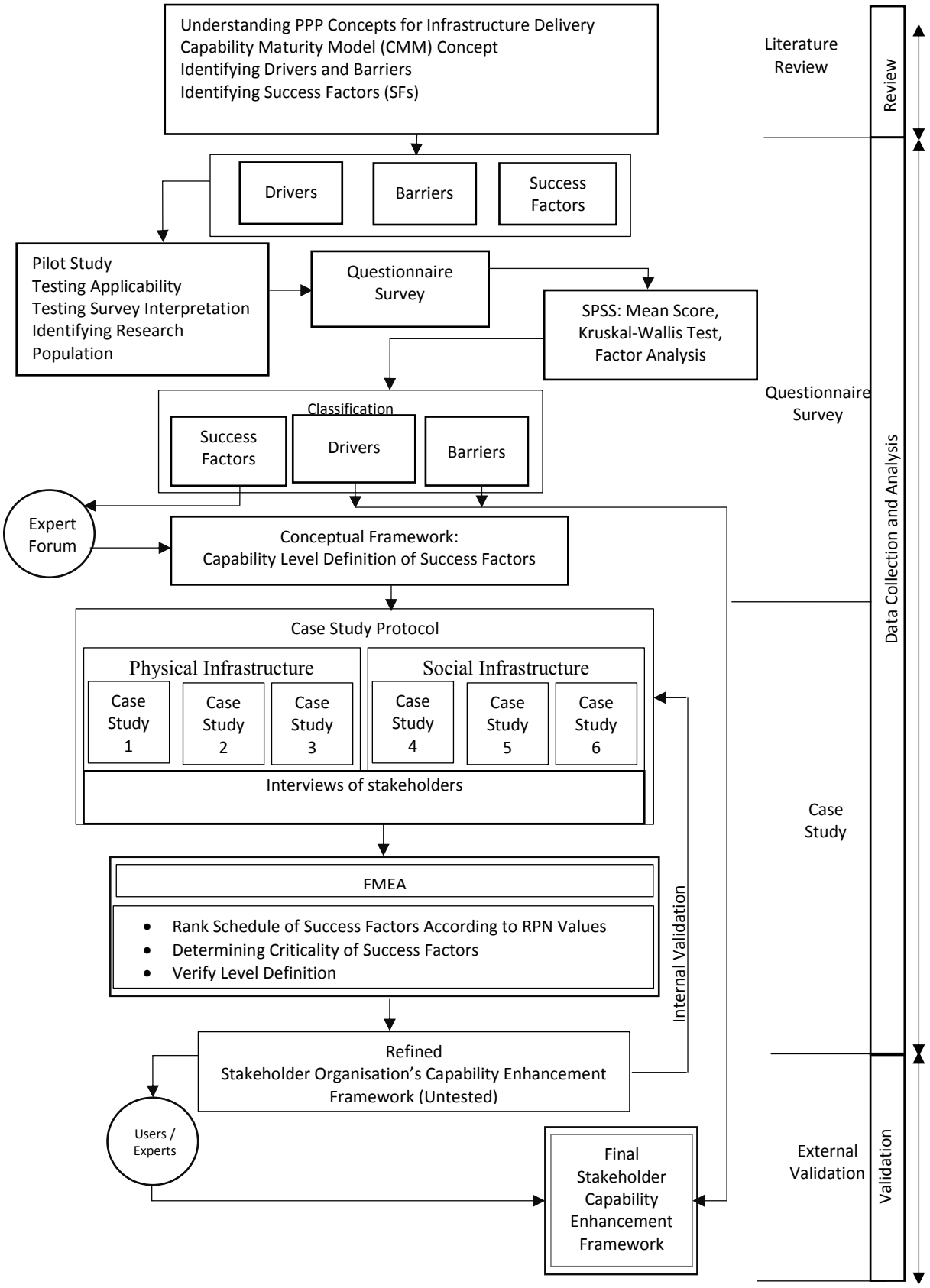


Figure 1.1: Indicative research methodology

The indicative research methodology in Figure 1.1 is briefly explained as follows:

i. **Literature review:** A comprehensive review of the literature was conducted to achieve complete objectives 1 and 2. For instance, objective 1 was addressed through an extensive review of literature carried out to explore and understand the PPP concepts for infrastructure delivery across the globe. Objective 2 was further addressed through an extensive review of the literature on Capability Maturity Model (CMM) concept with a view to identifying gaps in existing knowledge. In the same vein, objectives 3 and 4 were partially achieved through an extensive literature review. In which the outcomes provided a generic overview that led to the followings: identification of the drivers and barriers to PPP infrastructure projects, and identification of success factors for PPP projects implementation from international perspectives. The secondary sources of data employed when reviewing the literature include textbooks, academic journals, conference proceedings, government publications, working papers, electronic materials among others.

ii. **Questionnaire survey:** The remaining part of objectives 3 and 4 were accomplished using questionnaire survey. The identified drivers and barriers, and success factors gathered in a wider context through an extensive review of literature were used to develop a questionnaire survey with a view to determining their applicability in Nigeria. Non-probability sampling technique, precisely purposive sampling method was used for the selection of respondents because the research involved only respondents already involved in PPP infrastructure projects from both the public and private sectors. This is justified by Blaxter *et al*. (2006) that non-probability sampling is employed when the researcher lacks a sampling frame for the population in question, or where a probabilistic approach is not judged to be necessary. The respondents (target population) for this research were five different stakeholder organisations involved in PPP infrastructure projects implementation in Nigeria. These include public sector authorities (i.e. ministries, department, and agencies), concessionaires, local lenders/banks, consultants, and contractors. The questionnaires were distributed face-to-face to the respondents, and follow-up visits were made. The questionnaire designed for this research was the structured and multiple-choice type. The quantitative analysis findings in research objective 4 were scrutinised and taken to the six PPP project case studies.

iii. **Case Studies:** In order to have in-depth understanding of the research propositions due to the exploratory nature of this research, case study approach (including structured interviews within each case study) were employed in achieving objectives 5-7. Objective 5 was partially achieved through the expert forum. For instance, the identified success factors were used for capability maturity levels definition through a rigorous compilation of specific characteristics of each maturity level ranging from level 1(Ad hoc) to level 5(Optimising) in accordance to Capability Maturity Model (CMM) concept. Thus, a five-man expert panel was constituted and refined the capability maturity levels definition. This led to the development of the conceptual framework (see Figure 1.1). Therefore, objectives 6-7 and the remaining part of objective 5 were achieved in the six PPP case studies: verified the capability maturity level definitions; assessed the criticality of identified success factors, and determined the critical success factors (CSFs) that made PPP infrastructure projects successful in Nigeria. This approach is supported by some previous researchers. For instance, Robson (2002) describes case study approach as a strategy for doing research that involves the investigation of a particular contemporary phenomenon within its real-life context. Zonabend (1992) states that case study research is done by giving particular attention to complexities in observation, reconstruction, and analysis of the cases under study and is done in such a way that it incorporates the views of the 'actors' in the case under study. Amaratunga & Baldry (2001) assert that a paramount advantage of the case study material lies in the richness of its detailed understanding of reality. Moreover, archival records, structured interviews, and direct observations were explored on the six case studies comprised three PPP physical infrastructure projects and three PPP social infrastructure projects case studies (see Figure 1.1 for details). For instance, structured interviews were conducted face to face with six stakeholders (i.e. from both the public and private sectors) in each case study. Thus, objectives 5, 6 and 7 were satisfactory achieved.

iv. **FMEA technique:** A quantitative measure was undertaken to support qualitative approach in the six PPP case studies. Therefore, the quantitative data obtained in the six case studies were analysed using Failure Mode and Effect Analysis (FMEA) technique. FMEA was used to determine the criticality of success factors in each of the case studies (see Figure 1.1 and Section 5.14 in Chapter 5 for detail).

Thus, the findings from the case study methodology revealed the CSFs for PPP infrastructure projects in Nigeria using FMEA technique.

v. **Validation:** The objective 8 was achieved through internal and external validation (see Figure 1.1). Internal validation was performed by taking the final framework back to the top management/ key stakeholders in the six case studies for the assessment of the framework. In the same vein, external validation was conducted through the selected potential users of the framework in both the public and private sector organisations and academia. The potential users were purposively selected to validate the framework. Since, the information solicited requires in-depth knowledge and sound experience in PPPs. The potential users were purposively selected. Some previous researchers widely support the selection of potential users (respondents) using a purposive approach (see Bryman, 1996; Morgan, 1998; Edmunds, 1999). The following criteria were adopted to identify the eligible participants in the validation of the framework correctly:

- Respondents having extensive working experience in PPP infrastructure projects in Nigeria.
- Respondents to be directly involved in 2 or more PPP infrastructure projects in Nigeria.
- Respondents to have reached a managerial level in the public sector or CEO/MD or head of the unit in the private sector or active researcher in academia.

Therefore, the respondents who met all the criteria were selected. The developed capability enhancement framework was presented to the selected users for validation. The validation of the framework is believed to enhance its acceptability and usability in both the industry and academia.

1.5 Scope and limitations of the Study

The research focuses on physical and social infrastructure PPP projects in Nigeria, such as; airports, roads, seaports, rails, market complex development, universities hostel accommodation and housing infrastructure facilities among others. The Infrastructure Concession Regulatory Commission (ICRC) law was established in 2005 to create the enabling environment by providing the legal and institutional framework for PPPs to operate successfully in Nigeria. It is on this premise that the PPP infrastructure projects examined in this research were limited to PPP projects undertaken between 2006 and 2014. The study

area is restricted to Lagos metropolis in South-western Nigeria because of the following reasons: accessibility to conduct the survey to obtain required data; availability of substantive PPP experts; and appropriateness of the PPP infrastructure project for the analysis. A total of six PPP case studies were selected from the study area. The selected six PPP infrastructure project case studies were grouped into two sets. The first set is termed 'physical infrastructure or civil and engineering' PPP projects (i.e. case study 1-3). This includes: concession of Lekki-Epe Expressway (road); the concession of Muritala Mohammed Airport (MMA2); and the concession of seaports.

The second set is called 'social infrastructure or building' PPP projects (i.e. case study 4-6). This comprises: development of university hostel accommodation (Emerald Hostel at the University of Lagos); Kanti towers modern office complex; and development of Tejuosho ultra-modern shopping complex. The rationales for selecting these PPP infrastructure projects as case studies are: (i) they are the first set of PPP infrastructure projects awarded by federal government and Lagos state government in Nigeria; (ii) these PPP case studies are in operations stage; (iii) it is apparent that these selected PPP case studies exhibiting the appropriate characteristics of critical success factors that made it attained different level of success; and (iv) the stakeholder organisations involved in these PPP case studies have the ability to determine their current maturity levels and possibility for continuous improvement.

1.6 Structure of the thesis

The thesis consists of nine chapters. The structure and order of writing of the chapters are presented in Figure 1.2 and the contents of each chapter are briefly described on the next page.

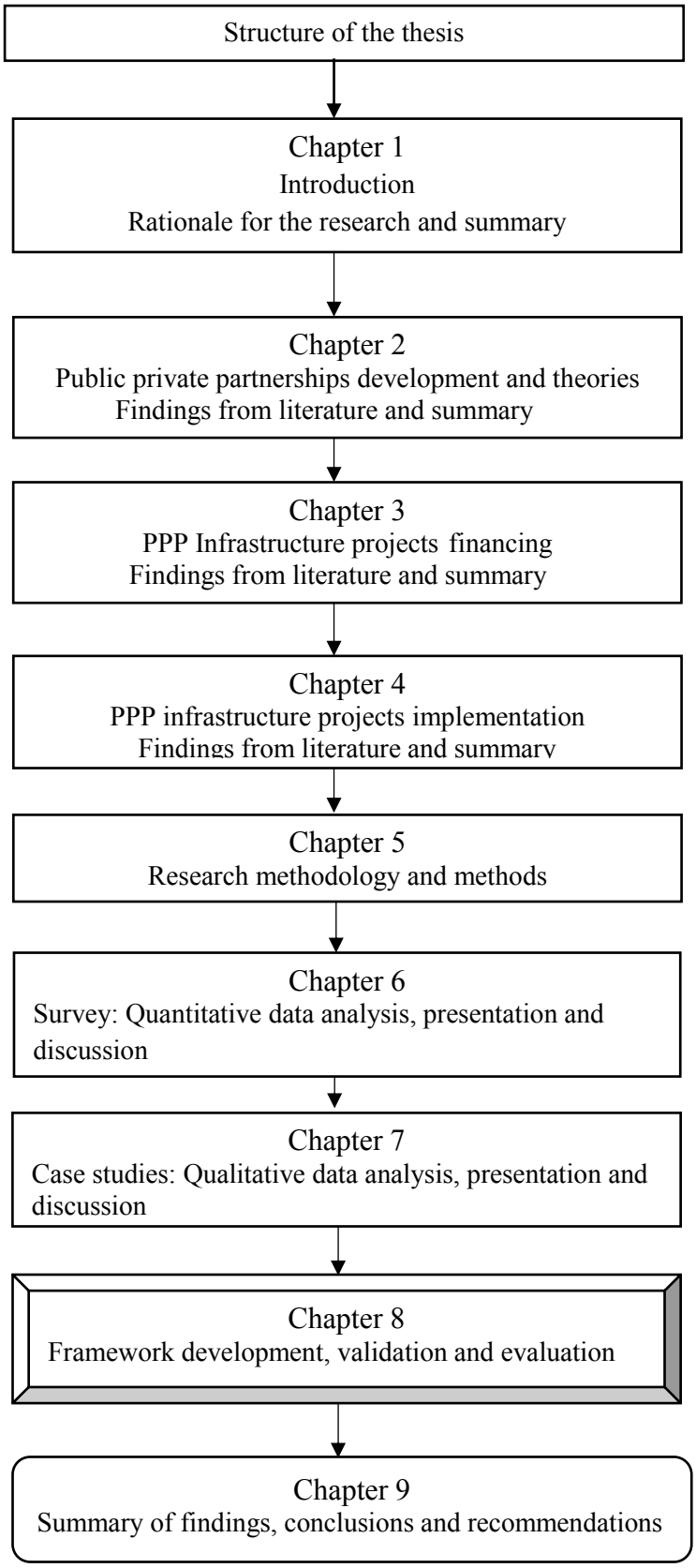


Figure 1.2: Structure of the thesis

Chapter 1 gives the introduction to the research study; it encompassed background of the study, problem statement, aim and objectives, research methodology employed, and scope of the study among others.

Chapter 2 focuses on PPPs development and theories comprised the history and concepts of PPPs as well as theoretical approaches relevant to PPPs among others. This chapter also shed light on the followings: infrastructure projects procurement, traditional practice of procuring public works and reasons for paradigms shift of procuring public works, PPPs in Nigeria, maturity models in construction industry, concept of Capability Maturity Model, PPP market maturity to mention a few.

Chapter 3 provides a comprehensive review of PPP infrastructure projects financing. This comprised the need for infrastructure financing, financing mechanisms for PPP infrastructure projects, private participation in infrastructure financing, overview of Nigeria economy, Nigeria construction industry, concept of infrastructure, current state of infrastructure development in Nigeria and rationale for PPPs in Nigeria.

Chapter 4 further provides a thorough review of previous studies on PPP projects implementation. This encompassed value for money in PPPs, the risk in PPPs, drivers for adopting PPPs, barriers for PPP projects implementation, critical success factors for PPP projects, and lessons learnt from international best practices.

Chapter 5 focuses on research methodology and methods employed for the study. This includes research design, quantitative and qualitative research strands, and tools for data analysis among others.

Chapters 6 and 7 provide insight into data analysis and results of the analysis of data from quantitative and qualitative research strands comprised questionnaire survey and case studies. Presentation of archival data and case studies reports are presented.

Chapter 8 presents the relevant process that led to the development of the framework, which is a stakeholder organisations' capability enhancement framework (SOCEF) for PPP infrastructure projects in Nigeria. Based on this framework both the public and private sector organisations can better conduct future PPP projects in Nigeria. Also, the findings from the validation process are presented.

Chapter 9 comprises a summary of findings, conclusions of the study, recommendations emanated from the study's findings, limitations of the study, and areas for further research are suggested.

1.7 Chapter summary

This chapter outlines the framework for this research considering the background of the study, research aim and objectives among others. The indicative research methodology framework and structure of the thesis framework are presented in this chapter.

Chapter 2: PUBLIC PRIVATE PARTNERSHIPS DEVELOPMENT AND THEORIES

2.1 Introduction

The procurement of most public infrastructure facilities and services is traditionally the responsibility of government. History indicates that PPP as a procurement in the provision of infrastructure projects is no longer new. For instance, Howes & Robinson (2005) assert that the introduction of turnpikes in the early 18th century was a primitive example of privatisation where landowners set up tolls for passage across their land by means of tracks and earth roads. Also, the development of railways in the UK as an alternative means of transport to canals and roads during the 19th century led to complete privatisation of national railway provision involving local and regional companies (Howes & Robinson, 2005). Governments in most developing countries and emerging markets are experiencing challenges to meet the growing demand for new and better public infrastructure services and facilities. This is corroborated by United Nations (2011) report that the available funding from the conventional sources and capacity in the public sector to implement some infrastructure projects remain limited.

Based on the foregoing, the governments in many countries ranging from mature economies to emerging markets economies have found partnerships with the private sector as an attractive alternative to increasing and improve the supply of public infrastructure facilities. Thus, PPPs are guided by a simple belief that governments (i.e. public) and private party working in a successful collaboration or partnership to deliver infrastructure projects that have better outcomes than any one party could achieve on their own. The partnership is built and sustained on the expertise and competence of each partner i.e. the public and private sectors. Therefore, this chapter contains history and concept of PPPs, theoretical approaches relevant to PPPs, infrastructure project procurements, capability maturity models (CMM), maturity models in the construction industry, PPPs market maturity among others.

2.2 History of public private partnerships

It is evident that there is nothing new with the involvement of the private sector in the delivery of public facilities and services, but in the past it was either restricted to financing or long-term provision of services (Roumboutsos & Liyanage, 2013). For instance, Cartlidge (2006) asserts that in France, the Canal du Midi was completed in 1681 with the use of private finance; in 1858, Build-Operate and Transfer (BOT) was used in Egypt for the

construction of Suez Canal. In the mid -19th century, many publicly accessible roads and railways in Europe, particularly in the United Kingdom, and United States are constructed using private finance on the basis of concession (Howes & Robinson, 2005; Cartlidge, 2006; Bult-Spiering & Dewulf, 2006; Yescombe, 2007). Surprisingly, in the mid-20th century using private finance to develop public facilities and services witnessed a downturn (Cartlidge, 2006). This research paid attention to the history of PPP from the UK context, as UK is the largest user of PPP/PFI in the world (IISD, 2012).

In 1981 in the UK, the National Economic Development Council formulated the Ryrie Rules; the rules among other things seek to establish criteria under which private finance could be introduced into the nationalised industries. In 1988, the rules were revised to ensure that private finance are only introduced when the value for money or cost effectiveness among others are certain (HM Treasury, 2000). The change came in 1992. It was at this time that the Conservative Government formally launched the Private Finance Initiative (PFI). Since its introduction in 1992 by John Major's Conservative government, the PFI/PPP has received considerable research attention (Spackman 2002; Greenaway *et al*., 2004; Broadbent & Laughlin, 2005; Flinders 2005). In 1992 to 1997 when the Labour Government came to power, the UK government gave PFI more attention (Yescombe, 2007; Pretorius *et al*., 2008). In 1997, a change in government led to restructuring of PFI approach with a view to promoting best practice. For example, a Treasury Taskforce was formed to be the central focal point for all PFI activities across the government.

In 2000, Partnerships UK (PUK) was created to replace the Treasury Taskforce. PUK works with both the public and private bodies on specific PPP transactions to improve the process of planning, negotiating and completing PPPs (HM Treasury, 2000). PUK itself was a PPP with both public (49%) and private sector (51%) shareholders (HM Treasury, 2000; Yescombe, 2007). HM Treasury (2000) further reports that in the same year 2000 the Office of Government Commerce (OGC) was established. Within OGC, the Private Finance Unit (PFU) handles the developing and promoting PFI policy for public bodies. It works with customers, industry and utilises the services of Partnerships UK to identify and disseminate advice on best practice (HM Treasury, 2000). Today, the progress made UK the widely recognised as the most progressed, active, and committed country dealing with PPP/PFI policies (IPPR, 2001; Deloitte, 2006; OECD, 2008).

2.3 Overview of partnerships between public and private sectors

Partnerships between the public and private sectors have received global support from the political leaders, policy/decision makers, officers, local communities among others. Audit Commission (1991) reports that partnerships remain a policy agenda at all levels of government, particularly in the UK. This is affirmed by Osborne (2000) that government of many countries embraced partnerships for the provision of public services and facilities. Leach *et al*. (1994) claim that the local level enjoyed a partnership with both the public and private bodies as well as with non-governmental organisations. It is evident that the enormous recognition of the inherent benefits of partnership triggered its greater acceptance at all levels of government. Kernagham (1993) describes partnership as a relationship with others that embraces sharing of power; work; support; information among others with a view to achieving common goals. Franco & Estevao (2010) argue that partnerships are ways of co-operation of relevant importance to achieving long-term strategic thinking.

Osborne (2000) asserts that there are many assumptions underlying definitions of partnership. For instance, there are forms of synergy; the partnership involves both development and delivery of a strategy or a set of projects or operations, and in PPPs the public sectors are not pursuing purely commercial goals. Therefore, in PPP, the partnerships between the public and private sector are increasingly become an alternative to the conventional methods of procuring public infrastructure facilities and services (Akintoye *et al*., 2003). Given this, the partnership allows the public and private sector to utilise their special skills and achieve better outcomes that none of each could achieve alone (Akintoye *et al*., 2003). Therefore, there are some reasons to form partnerships, particularly in the public service delivery. Prior researchers have identified reasons for a partnership to include risk sharing opportunities; achieving greater levels of efficiency and economies of scale; innovations and technology transfer among others (Riege *et al*., 2001; Osborne, 2000). This section will not complete without identifying elements of a successful partnership. In this regards, Spink & Merrill-Sands (1999) identify elements of a successful partnership (see Figure 2.1) on the next page.

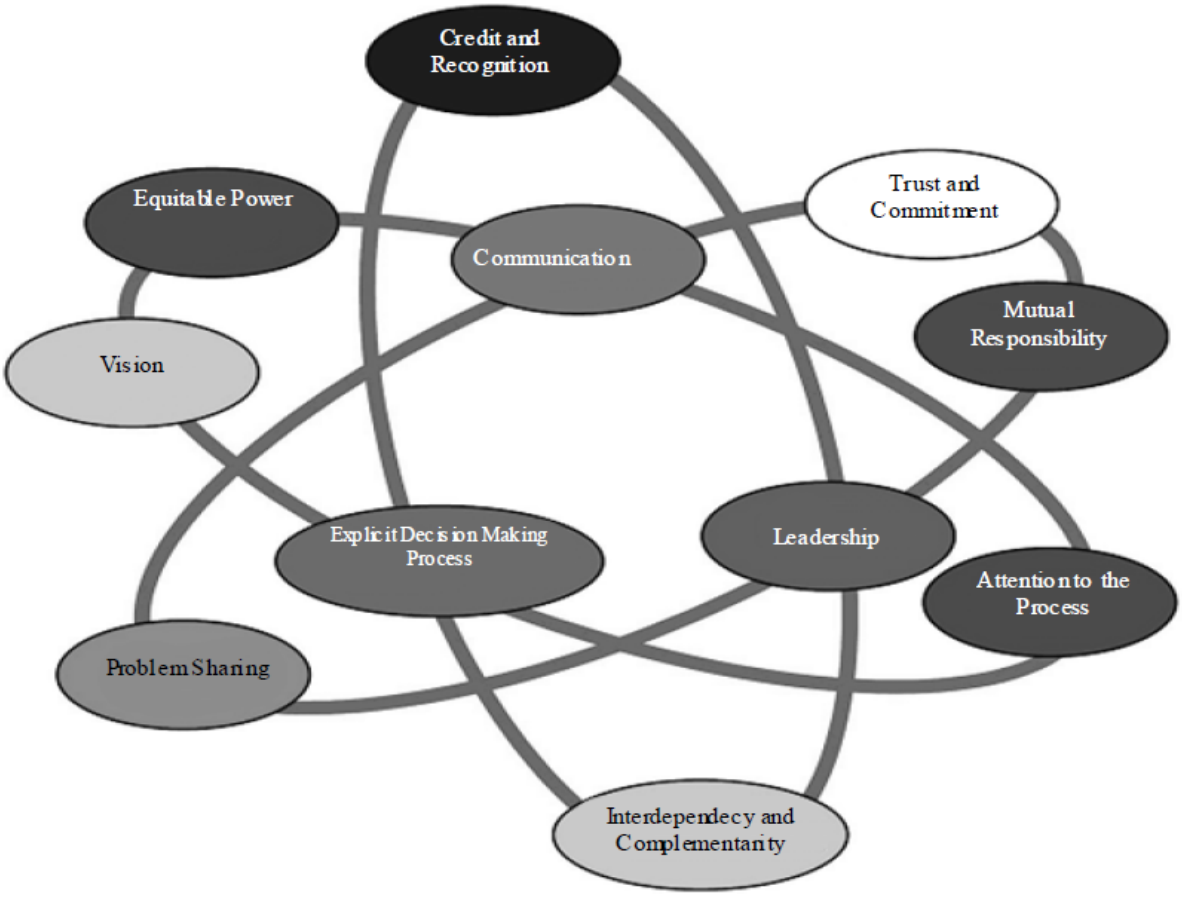


Figure 2.1: Element of a successful partnership (Adapted from Spink & Merrill-Sands, 1999, p. 5)

Therefore, the elements of the successful partnership include; trust and commitment, communication, mutual accountability among others (see Figure 2.1 for details). These elements are mutually dependent on each other. Thus, successful implementations of these elements guarantee the survival of any partnership.

2.4 The concepts of public private partnerships

The concept of PPP has existed for centuries in the UK, US, France, Spain among others. Today, many countries are now developing PPP programmes for the provision of public infrastructure facilities and services. This has resulted in significant increase in the volume and number of PPP projects across the globe since the 1990s. Earlier researchers and some professional bodies and organisations have defined PPPs in various forms. This has led Li & Akintoye (2003) to claim that there is no specific definition for PPPs and that all the definitions have common features. Given this, Yescombe (2007) concludes that PPPs must be seen within the overall context of the public sector reform that encourages contracting out public services to the private sector.

HM Treasury (2012) reports that the arrangement of PPP is structured in a way to provide greater flexibility by altering the conventional role of both the private and public sectors with the overall aim of achieving value for money. US Department of Transportation (1994) reports that no matter the level of involvement of the private sector, the government continues to play a vital role by providing enabling environment; supports/guarantees; security/safety among others. Existing studies revealed that some PPP models are implemented in different countries. Figure 2.2 indicates the PPP models with the level of private sector responsibility. For example, as 'Y' increases the greater the responsibility of private sector. Also, as 'X' increases the higher the level of risk assumes by the private sector. The Figure 2.2 is categorised into three zones. The first zone from the base portrays traditional/conventional procurement methods and there is no involvement of private sector. The second zone is termed PPP models, this zone indicates that as PPP model increases the greater the both private sector responsibilities and risk assumed. The third zone is interpreted as outright privatisation due to huge private sector responsibilities and greater risks assumed by the private sector.

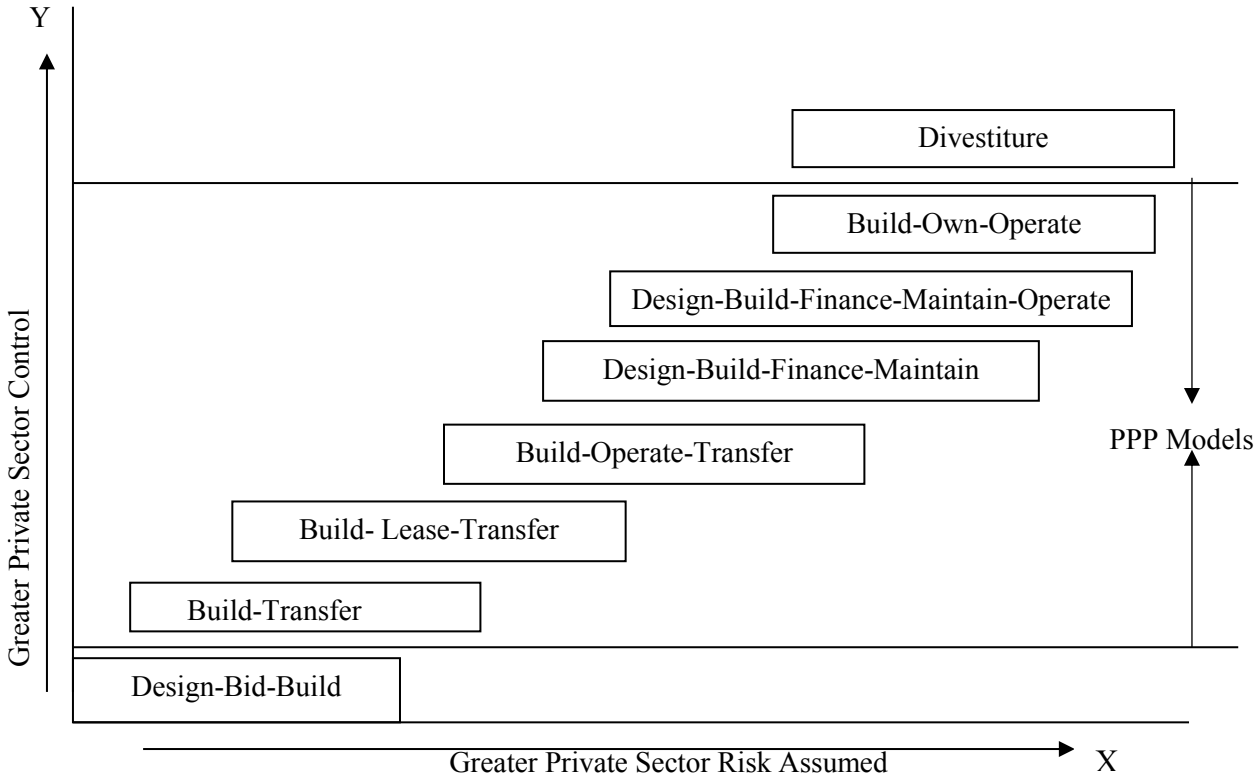


Figure 2.2: PPP models (Adapted from Siemiatycki, 2012, p. 5)

The PPP models in Figure 2.2 are briefly describe as follows:

- **Design-Bid-Build (DBB):** This is the traditional procurement model for project delivery, this procurement model is highly disaggregated and sequential in the way that inter-organizational interdependencies are managed (Siemiatycki, 2012). The facility is designed by a government agency in collaboration with a team of consultants and they initiate a competitive bidding process to select a separate team of construction contractors to build the facility to the specifications (JCT, 1998; Miller, 1999; Masterman, 2002; Howes & Robinson, 2005; Siemiatycki, 2012). Construction is funded by government (public) and the government is acting in the role of a client who is in direct control (Howes & Robinson, 2005; Siemiatycki, 2006).

- **Build-Transfer (BT):** The government engage a private partner to design and build a facility to meet public sector performance specification. After the completion, the facility is transferred to the government. Therefore, the operation and maintenance of the facility becomes the sole responsibility of government. This model has been successfully applied to a generic range of construction projects and its application may be employed in certain large infrastructure projects (Deloitte, 2007; CCPPP 2007; IDD, 2009).

- **Build-Lease-Transfer (BLT):** Under this model, the facility when completed, it is leased to the private sector for a fixed period. During the lease, the operations and maintenance of the facility become the responsibility of the private sector (Deloitte, 2007; IDD, 2009).

- **Build-Operate-Transfer (BOT):** This model provides the necessary incentive for private investment by allowing the concessionaire to operate the facility in return for the right to collect user related revenues during the agreed concessionary period. At the expiration of concessionary period all operating rights and maintenance responsibilities revert to the government (Howes & Robinson, 2005; Deloitte, 2007; IDD, 2009).

- **Design-Build-Finance-Maintain (DBFM):** Under this model, the private sector provides facility management or maintenance services under a long-term agreement (CCPPP, 2007).

- **Design-Build-Finance-Maintain-Operate (DBFMO):** Under this model, the private sector provides facility management services as well as operations under a long-term agreement (CCPPP, 2007).

- **Build-Own-Operate (BOO):** The concessionaire or private sector operates a facility without the transfer of ownership to the public client. (Howes & Robinson, 2005; CCPPP, 2007).

- **Divestiture:** Under this model, the private sector takes ownership of all assets and has control over all investment, maintenance and operations decisions subject to regulatory oversight. (Deloitte, 2007, OECD, 2008a).

Deloitte (2007) further identify hybrid of PPP models to include alliancing, bundling, integrator, and joint venture. Table 2.1 indicates few examples of PPP models adopted in various sectors in different countries.

Table 2.1: PPP models adopted in different countries in various sectors

Sector	Country	PPP model
Transport	Australia, Canada, France, Greece, Ireland, Italy, New Zealand, Spain, UK, Russia, Portugal, Germany, US, Turkey, Singapore, China, India, Sri Lanka, Brazil, Argentina, Chile, Mexico, Peru, South Africa, Nigeria, Zimbabwe, Togo	DBOM, BOT, Divestiture, BROT, ROT, BOO, BLT
Water, wastewater, and Sewerage	Australia, France, Ireland, UK, US, Canada, Turkey, Singapore, India, China, Malaysia, Indonesia, Brazil, Mexico, Peru, Algeria	DBO, BOT, BROT, ROT, DBOO, Divestiture
Education	Australia, Netherlands, UK, Ireland, India	DBO, DBOM, BOOT, DBFO/M, integrator
Housing/Urban Regeneration	Netherlands, UK, Ireland, Nigeria	DBFM, joint venture
Hospitals	Australia, Canada, Portugal, South Africa, UK	BOO, BOOT, integrator
Defence	Australia, Germany, UK, US	DBOM, BOO, BOOT, alliance, joint venture
Prisons	Australia, France, Germany, UK, US	DBO, BOO
Energy	Turkey, Bulgaria, Romania, Ukraine, China, Singapore, Bangladesh, India, Sri Lanka, Pakistan, Vietnam, Thailand, Philippines, Malaysia, Indonesia, Argentina, Brazil, Botswana, Kenya, Tanzania, Zambia, Rwanda, Nigeria	BOT, BOO, BLT, ROT, Divestiture
Telecommunications	Singapore, Philippines, Thailand, India, Malaysia, Indonesia, Ukraine, Russia, Turkey, Brazil, Nigeria	joint venture, BOT, divestiture

(Adapted from Deloitte, 2007; World Bank, 2012)

It is evident from Table 2.1 that PPP models are adopted in many countries ranging from mature economies to emerging market economies for the provision of public infrastructure facilities and services.

2.5 Theoretical approaches relevant to the concept of the public-private partnerships

Willing (2001) argues that without a theory there is nothing to research. Therefore, there are some theories relevant to PPPs. These include game theory, the theory of collaborative advantage, public choice theory, x-efficiency theory, stakeholder theory, governance theory among others. This research study reviews the theory of x-efficiency, stakeholder theory, and governance theory due to the following reasons. X-efficiency theory is considered for review because of official financial, and monetary policies are used to bail out some countries from failure to finance infrastructure, particularly developing countries and emerging markets. Stakeholder theory is also considered for review with a view to identifying the stakeholders, and investigating the relationships between the stakeholders and their responsibilities in the PPPs process with the aims of developing capability enhancement framework in PPPs that include stakeholders' participation. Governance theory is further considered for review because PPPs are a distinctive feature of governance. The governance theory reveals the element of good governance that is the bedrock for PPPs survival.

2.5.1 Theory of X-Efficiency

The theoretical underpinning of the concept of the PPPs can be traced to the theory of x-efficiency developed by Leibenstein (1966). X-efficiency is the effectiveness with which a given set of inputs is used to produce outputs. The idea is that public institutions cannot fail as long as official financial and monetary policies are expansionary enough to bail them out or to limit their probability of failure (IMF, 2006). X-efficiency is also guided by preventing the wasteful use of inputs (OECD, 2008b). PPPs are imperative in public organisations to reduce inefficiencies and allow public organisations to respond to market forces and become more competitive (IMF, 2006). In order to achieve X-efficiency proponents in public organisations, there must be a paradigm shift from traditional public administration to New Public Management (NPM), as NPM put emphasis on achieving results without over spending or under spending.

IMF (2006) reports that the inefficiencies in public organisations in the early 1980s led to the emergence of the New Public Management (NPM) in the United Kingdom (under former Prime Minister Margaret Thatcher) and other countries. The NPM been developed in different ways in various countries and is therefore not considered to be a global phenomenon, but rather reflects a particular character in each country in which it has been adopted (Stoker, 1999). For example, United States considered the development of the theory as calling for an entrepreneurial government (Ott, 2002). Different authors have attached different names to it: "managerialism" (Pollitt, 1996); "new right" (Lawton & Mckevitt, 1994); while Osborne & Gaebler (1992 cited in Considine & Painter, 1997) refer to it as an "entrepreneurial government". Jones *et al*. (2001) state that the shift to the NPM in China required a significant transformation in the culture of the civil service, from one focused on input-oriented public administration to a managerial culture focused on practical outcomes. This led to the employment of business managers to complement the execution of functions by traditional service administrators to bring them up with new changes and ethos (Binza, 2009).

The essence of the NPM is that governments should become flexible; linear; efficient; effective; and economical to improve the quality of life of all people (Minogue, 1998; Fox *et al.,* 1991). The view is that linear governments should achieve value for money (VfM) in carrying out infrastructure development. This is corroborated by IMF (2006) that the restructuring and innovation reinvented by NPM in public organisations/institutions over the years made PPPs more attractive as an alternative ways to finance and manage the public infrastructure projects to achieving value for money.

2.5.2 **Stakeholder theory**

The word 'stakeholder' originated from Stanford Research Institute (SRI) in the 1960s (Freeman 1984; Cohen, 1996; Stoney & Winstanley, 2001; Fontaine *et al*., 2006; Freeman *et al*., 2010). They defined stakeholder as "those groups without whose support the organisation would cease to exist". Cohen (1996) argues that the term stakeholders generalise the only group to whom management need to be responsive. Freeman (1984) defines stakeholders as "any group or individual who can affect or is affected by the achievement of the organisation's objectives". Freeman *et al*. (2010) further describe stakeholders as "those groups who are vital to the survival and success of the organisation". Li *et al*. (2013) define stakeholders as "those who can influence the project process and/or

final results, whose living environment is positively or negatively affected by the project, and who receive associated direct and indirect benefits and/or losses".

Brenner & Cochran (1991) assert that the central idea underlying the stakeholder theory is that the organisations are committed to addressing a set of stakeholders' expectations. It is on this note that Jones & Wicks (1999) identify the main proponents of stakeholder theory as follows: the interests of all stakeholders have intrinsic value, and no set of interests are assumed to dominate the others; the theory focuses on management decision-making; and the organisation has relationships with many groups (stakeholders) that affect and are affected by its decisions. Donaldson & Preston (1995) identify three-way categorisation of approaches to the stakeholder theory. This includes normative stakeholder theory; descriptive stakeholder theory; and instrumental stakeholder theory. Friedman & Miles (2006) state that normative stakeholder theory encompasses theories of how stakeholders should act and view the purpose of the organisation, based on some ethical principle. Descriptive stakeholder theory is concerned with how stakeholders behave and how they view their actions and roles. Lastly, instrumental stakeholder theory deals with how stakeholders should act if they want to flavour and work for their interests (Fontaine *et al*., 2006; Friedman & Miles, 2006).

Therefore, for PPP projects to be successful it is necessary to consider 'groups or individual outside' the government and private sector as part of stakeholders that need to be informed and engaged in consultation at very beginning of PPP project process especially the communities/residents or the users, media, labour unions/special interest groups among others. Thus, Figure 2.3 reveals the examples of stakeholders in PPP projects.

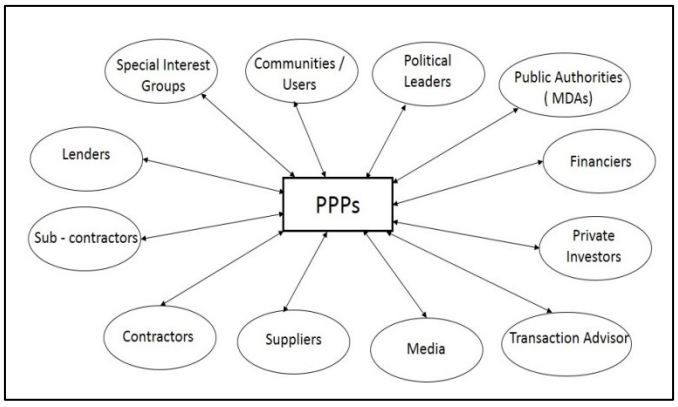


Figure 2.3: Examples of stakeholders in PPPs project (Author's view)

The stakeholders' involvement is critical to the sustainability of PPPs; it plays an active role in the PPPs process. Similarly, particular stakeholders have different interests that influence

how they approach their role (ADB, 2008). It on this premise that Alfen *et al*. (2009) identify the principal stakeholders in PPP infrastructure projects and their contributions as presented in Table 2.2 as follows:

Table 2.2: Selected stakeholders in PPP infrastructure projects and their contributions

Objectives	Contributions
Project executing organisation	
Efficiency gain	Concession/ licenses
Leveraging of government budget	Service fee
Acceleration of the project	
Better service quality	
Compliance with requirement and regulations	
Sponsors	
Adequate rate of return	Equity
Strategic capability	Competence and experience
Investors	
Maximising of return	Private equity
	Monitoring of quality
	Financial competence
Lending banks	
Loan repayment	Debt
Careful financial evaluation	Monitoring of quality
	Financial competence
Development finance institutions (DFIs)	
Loan repayment	Debt
Support of development goals	Monitoring of quality
	Financial competence
Construction contractor	
Sufficient margin	Required construction work
	Turnkey fixed-price contract
Facility manager and operators	
Sufficient margin	Required service
	Fixed-price contract

(Source: Alfen *et al*., 2009)

PPP project involves some important contractual arrangements among the participants. It is a complex network of relationships involving multiple parties, and their formal relationships are defined by contracts (Alfen *et al*., 2009). Thus, the role of the selected PPP stakeholders is presented in Table 2.3 on the next page:

Table 2.3: Role of selected stakeholders in the PPP process

Stakeholder	Role
Political decision makers	Establish and prioritize goals and objectives of PPP and communicate these to the public Approve decision criteria for selecting preferred PPP option Approve recommended PPP option Approve regulatory and legal frameworks
Company management and staff	Identify company-specific needs and goals of PPP Provide company-specific data Assist in marketing and due diligence process Implement change
Consumers	Communicate ability and willingness to pay for service Express priorities for quality and level of service Identify existing strengths and weaknesses in service
Investors	Provide feedback on attractiveness of various PPP options Follow rules and procedures of competitive bidding process Perform thorough due diligence resulting in competitive and realistic bidding
Strategic consultants	Provide unbiased evaluation of options for PPP Review existing framework and propose reforms Act as facilitator for cooperation among stakeholders

(Source: Asian Development Bank, 2008)

There must be a consultation process to reconcile and prioritise issues, the situation that will lead to reaching a broad agreement on the objectives of PPPs. In achieving this, stakeholders must be given not only a forum for participation but also the information they need to participate effectively. This view is supported by Zou *et al*. (2014) that the complexity of stakeholders involved in PPP projects necessitated the needs for effective relationship management in PPP process. It is helpful to introduce the concept of stakeholder theory to the PPPs project and to use it as a basis to choose decision-making criteria (El-Gohary *et al*., 2006). Stakeholder theory helps in analysing demands of different stakeholders; ensures that profits are proportional to investments and risks (Shan *et al*., 2011). It helps in identifying the groups of stakeholders; differentiating between and categorising the stakeholders, and investigating and managing the relationships with the stakeholders in PPP projects.

2.5.3 **Governance theory**

Traditionally, governance is associated with the government. Rhodes (1996) asserts that governance is a new process of governing society. Pierre & Peters (2000) argue that governance is the capacity of government to make and implement policy with a view to steering society. The term "governance" in the context of public administration is described as “general exercise of authority” (Schulman *et al*., 1999; Grindle, 1997). Kjaer (2011) classifies governance into old and new. Kjaer (2011) describes old governance as a traditional notion of steering by national governments from the top down, and it has to do with degree of control that the government can exert over social and economic activities. On

the other hand, new governance has more to do with how the governments interact with society. Kjaer (2011) further argues that governance theory is primarily concerned with institutional change, and it involves human agency. Therefore, governance theory introduces elements of change that are often lacking in institutionalism.

Stoker (2002) asserts that governance perspective is embraced the increased involvement of the private sector and other voluntary organisations in service delivery and strategic decision making. Thus, this led to the sharing of government responsibilities. This act ought to be a right action that can be heightened to mean good governance (Davids *et al*., 2005). Good governance is thus central to creating and sustaining an enabling environment for development and for the quality services to be provided in an equitable, participatory, and transparent manner (Binza, 2009). Ismail *et al*. (1997) assert that good governance requires the authorities to liaise with communities, as they are the closest sphere of government to them, before taking any decisions that may affect their sustainable livelihoods.

Based on the foregoing, good governance promotes and strengthens PPPs, and it is required in sustaining PPPs practice (Bult-Spiering & Dewulf, 2006; UNECE, 2008). Good governance attempts to do more than mere efficient management of economic and financial resources or a particular public service rendered through PPP (Binza, 2009). It is a broad reform strategy to strengthen the civil society institutions, and to make governments at all levels more open and transparent; responsive; accountable; and democratic (Hughes, 2003). It is evident that all the attributes of good governance are the bedrock for PPPs survival. Thus, the concept of governance theory is required in PPPs practice to guaranty long-term success.

2.6 Infrastructure project procurement system

McDermott (1999) asserts that concept of procurement in construction can be described in many ways. For examples, Lenard & Moshsini (1998) describe procurement as an operational need that has to do with the provision of constructed facilities for a discrete life-cycle. CIB W92 (1991) defines procurement as a "framework within which construction is brought about; acquired or obtained". Howes & Robinson (2005) describe procurement as a method of procuring or acquiring infrastructure assets, facilities or services. Kumaraswamy (1994a) advocates for sustainable and synergistic procurement to accommodate the appropriateness of both developed and less- developed countries. Kumaraswamy (1994b) argues that paradigm shift for procurement system that consider more than speed; quality;

price competition and certainty; and risk transfer must be developed. McDermott (1999) opines that procurement system must encourage among other things: appropriate; people intensive technology and process; learning and skill development. Miller (1996) states that governments continue to search for stable procurement system that let new ideas; new technologies; new capital; and new firms while allowing existing firms to grow and evolve.

Masterman (2002) suggests that it is helpful to categorise the main procurement systems into four. This includes separated procurement system: This category contains the conventional system or traditional methods. The second procurement system is called integrated procurement system: this group comprises novated design and builds; design and build; develop and construct, package deal method; and turnkey approach. The third procurement system is referred to as management-oriented procurement system: this category encompasses construction management; management contracting; and design and manages. The fourth procurement system is called discretionary procurement system: this category contains partnering; and British Property Federation System. JCT (1998) identify four main procurement methods as follows: traditional/conventional; design and build; management; and integrated. Nevertheless, Miller (1999) asserts that the biggest news in the world of public infrastructure procurement is the rebirth of project delivery and finance as variables in infrastructure planning.

Therefore, Miller (1999) develops an operational procurement framework represented by horizontal and vertical axes. The two dimensions represent the means of project delivery and the means of project finance. Howes & Robinson (2005) develop infrastructure procurement framework that portrays the level of public control, private funding, integration, and fragmentation. It becomes necessary to develop a procurement framework that depicts the level of risk assumed by the private sector. This is supported by Clamp and Cox (1990) that categorisation of procurement system by the degrees of risk is essential. This study, therefore, presented infrastructure procurement system framework as illustrated in Figure 2.4 on the next page.

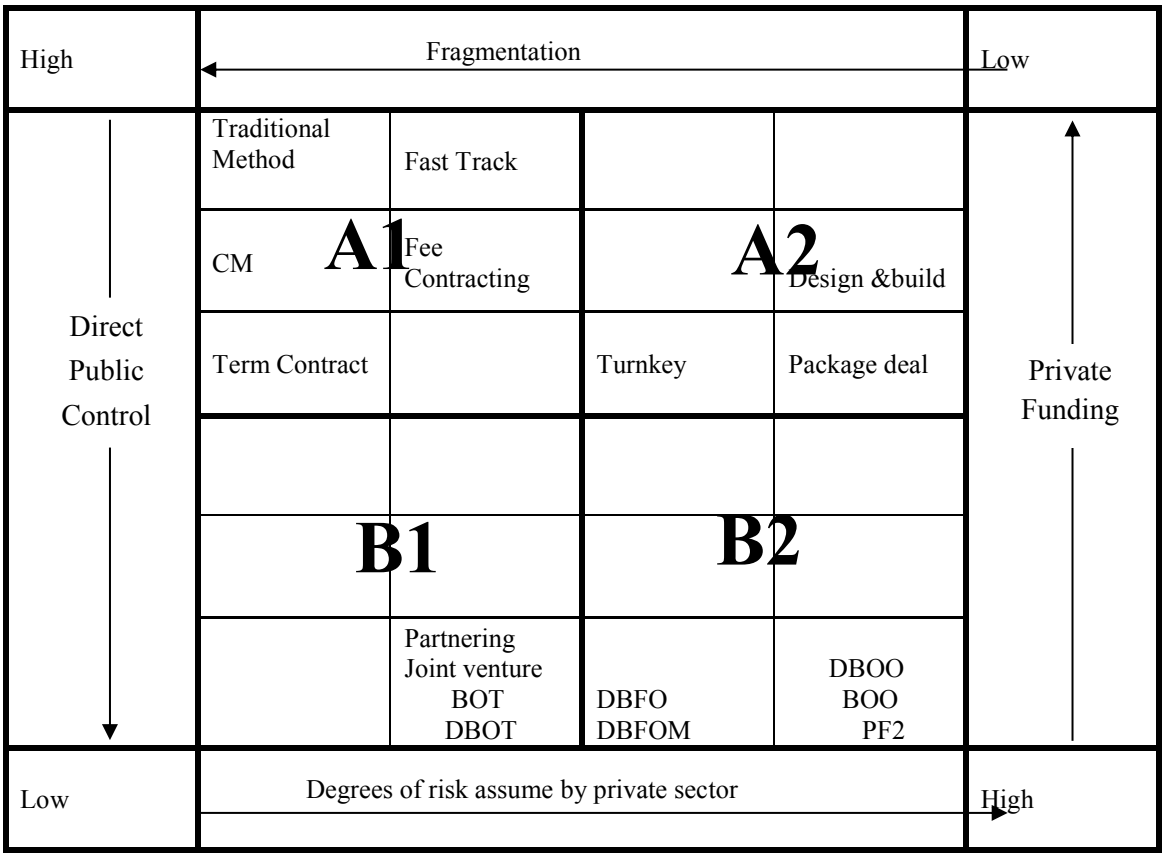


Figure 2.4: Infrastructure project procurement framework (Adapted from Howes & Robinson, 2005, p.120)

The infrastructure procurement framework is made up of four categories (see Figure 2.4) as A1; A2; B1; and B2. The A1 category relies solely on funding from the government (public) and the government is acting in the role of a client who is in direct control (Howes & Robinson, 2005). This category comprises traditional method; design and build; fast track; fee contracting; construction management; and term contract. The A2 category retaining the principle of public client control but the responsibility for design and construction lies with one organisation (Masterman 2002; Howes & Robinson, 2005). This includes turnkey; design and build; and package deal (JCT, 1998; Masterman 2002). The B1 category represents a lower degree of public control and certain degrees of risk assume by private sectors. This includes partnering; joint venture; build-operate-transfer (BOT); and design build operate and transfer (DBOT). Finally, the B2 is a category, where risks transfer and private finance are the driving factors. Then, the procurement methods need to be considered to have the ability to generate enough revenue to make the private investment worthwhile (Howes & Robinson, 2005). This includes design-build-finance-operate (DBFO); design-build-finance-operate-manage (DBFOM); design-build-own-operate (DBOO); build-own-operate (BOO); and private finance 2 (PF2) (Miller, 1999; Masterman, 2002; Howes & Robinson, 2005; HM Treasury, 2012).

2.7 Institutional framework to support PPPs

The success or failure of PPPs can often be traced back to the initial design of PPP policies, legislation, guidelines, and other forms of institutional frameworks (ICRC, 2012). The government has to do the needful in providing an enabling environment and commercially-oriented framework of law and regulation to enable PPPs to flourish (UNECE, 2008). Government effectiveness in establishing standard competitive tendering and bidding procedures in PPPs is very essential. Especially, in developing countries where investors' confidence is weak, is often essential for the PPPs market to grow in any sustained way (World Bank, 2011a). The legal framework needs to accommodate all participants in PPPs and to protect their rights among others (UNECE, 2008). European Union (EU) as largest PPP jurisdiction in the world provides a framework that comprises PPP institutional and legal structures in the EU Member States as shown in Figure 2.5 as follows:

Country	PPP Unit	PPP Law	Country	PPP Unit	PPP Law
Austria	A	–	Latvia	B	1
Belgium	C	2	Lithuania	B	3
Bulgaria	B	3	Luxemburg	–	–
Cyprus	B	–	Malta	B	–
Czech Republic	B	2	Netherlands	A	–
Denmark	B	–	Poland	B	1
Estonia	–	3	Portugal	B	2
Finland	–	3	Romania	C	2
France	B	2	Slovakia	–	–
Germany	B	–	Slovenia	C	3
Greece	C	2	Spain	–	1
Hungary	B	3	Sweden	–	–
Ireland	A	1	United Kingdom	A	–
Italy	B	3			

A - PPP unit existing (actively involved in PPP promotion)
B - PPP unit in progress (or existing but in a purely consultative capacity)
C - Need for PPP unit identified and some action taken (or only a regional PPP unit existing)

1 - Comprehensive legislation in place
2 - Comprehensive legislation being drafted / some sector-specific legislation in place
3 - Legislation being proposed

Figure 2.5: Status of PPP institutional and legal structure in EU Member States (Source: IISD, 2012, p. 16)

It can be deduced from Figure 2.5 that some Member States in the EU possess both the PPP law and PPP unit to varying degrees and some Member States have either PPP law or PPP unit at varying degrees, while few Member States have neither PPP law nor PPP unit. For instance, the UK that is recognised as the main proponent of PPP in the world has PPP unit but there is no PPP law. Spain, the second proponent of PPP in the EU, has no PPP unit but there is PPP law. Also, some countries in the EU (see Figure 2.5) have both the PPP Unit

(existing or in progress) and PPP law (comprehensive legislation in place/drafted/being proposed) still in the first stage (low level) of PPPs market maturity (Deloitte, 2007). Therefore, it is evident that it is not only the PPP unit or PPP law that is responsible for the successful PPPs implementation. It is on this premise that Wong (2007) asserts that successful PPP implementation has to do with stability and capability of the host government among others. Thus, it is evident that successful implementation of PPP project is a function of many factors.

2.8 Comparative review of PPPs: global context

PPPs have received much attention in the development and financing of the public infrastructure facilities and services in the last decade due to its inherent benefits and are now used in over 40 countries (Li *et al*., 2005a; Leiringer, 2006; RICS Policy Report, 2012). The impacts of PPPs are significant in delivering public infrastructure projects across the globe. For example, between 2005 and 2010 a total of 1046 PPPs deal worth US$350 billion reached financial close; PPP market peaked in 2007 when 241 projects with capital value of US$79 billion reached financial close; and 122 PPP deals reached financial close in 2010 with a total value of US$51.6 billion (RICS, 2012). PPPs are used by national and regional governments primarily in the UK, USA, Norway, Australia, Ireland, Canada, France, Norway, Spain, Finland, Japan, Malaysia, Singapore, South Africa, and Nigeria among others. It is necessary to explain briefly PPPs in selected countries that are main proponents of PPPs based on regions as follows:

The United Kingdom: The world's largest user of PPPs (Deloitte, 2007; IISD, 2012). This is affirmed by van den Hurk & Liyanage (2013) that the UK is the frontrunner of PPPs due to its early and ever continuing activities in facilitating private financing of public infrastructure. HM Treasury (2014) reports that as at 31 March 2014, there are 728 PFI projects of which 671 are operational in the UK with the total capital value of £56.6 billion. PFI practice has become well established, more importantly the UK service providers. Thus, the UK PFI model has been applied in many countries in the western world (Bult-Spiering & Dewulf, 2006).

The United States: The United States reluctantly undertakes PPPs prior to 2007 (PWC, 2010). Since 2007, the country has experienced the substantial volume of PPP projects (RICS, 2012). Notable among the PPP projects is the new terminal at JFK International Airport, Denver's fast Tracks commuter, light rail project, the Chicago Sky wall toll bridge

among others. PWF (2010) reports that between 1985 and 2010; a total of 363 PPP projects have been recorded, with a total value of US$59.5 billion.

Australia: The country has undertaken PPPs for some physical and social infrastructure projects including sporting facilities, toll roads, hospitals, prison, schools, and utilities among other in both the national and regional levels. The PPP market in the country is among the most mature in the world (RICS, 2012). English (2006) asserts that over 127 PPP projects have been recorded before the end of 2005, with a total value of AU$35.6 billion.

Canada: In Canada, PPPs have become increasingly institutionalised as a model of choice for delivering large-scale public infrastructure projects. Between 1990 and 2012, over 195 PPP projects have been built, or are in the planning and delivery pipeline. These PPP projects include the Highway 407 in Toronto, Brampton and Royal Ottawa Hospitals in Ontario, the Confederation Bridge linking Prince Edward Island and New Brunswick, a toll road connecting Fredericton and Moncton in New Brunswick, and the development of schools in Nova Scotia among others. At the national level, the most number of PPPs have been delivered in Ontario, British Columbia, Alberta and Quebec among others. PWF (2010) reports that as at 2010 over 100 PPP projects with a total value of about US$31 billion have been recorded.

India: Since 2000, delivering infrastructure services and facilities through PPP has garnered substantial pace. Over 300 projects have been delivered across the country. The priority of national government is road network, with about 86% of national highways are delivered using PPPs (RICS, 2012).

South Africa: South Africa is a leading country in Africa in term of utilisation of PPPs for public infrastructure projects. For instance, since 1994, about 50 PPP projects were undertaken at the national level and over 300 PPP projects executed at the municipal level (Farlam, 2005). The South African National Treasury is the agency responsible for all the PPPs transaction, and the agency has developed a PPP manual and standardised PPP provisions to guide all PPP projects.

2.9 PPPs in Nigeria

In Nigeria, there has been a rise in the number of PPP-driven infrastructure projects over the last 20 years. For example, between 1990 and 2009 over 51 infrastructure projects were executed through PPPs (Vetiva, 2011). In 2013 and 2014, about 66 PPP projects were in the

pipeline (ICRC, 2014). In terms of actual value, annual investments rise to US$3.1 billion from US$22.0 million in 1997, adding up to US$23.6 billion from 1990 to 2009. Based on actual value, investments in the Telecoms sector was the highest, totalling US$18.4 billion and accounting for 78% of the total investments within the period (Vetiva, 2011). The Federal Government of Nigeria (FGN) first passed the Infrastructure Concession Regulatory Commission (ICRC) Act in 2005 in an effort to create an independent body to manage and develop PPP transactions; the ICRC was officially inaugurated in November 2008 (ICRC, 2012). Thereafter, FGN approved comprehensive National Policy on PPPs in 2009 (World Bank, 2011a; ICRC, 2012). The policy addresses the roles and responsibilities of the ICRC as well as the other key Ministries; Departments; and Agencies (MDAs) involved in PPPs. The policy also outlines a clear process by which proposed PPP transactions are examined upstream to determine their commercial viability (World Bank, 2011a). After the creation of the national policy on PPPs, the ICRC has embarked on drafting detailed PPP regulations that expand on the provision set forth in the policy, and to address missing information such as institutional arrangements between MDAs and PPP procurement procedures (World Bank, 2011a).

The ICRC is responsible for developing and issuing guidelines on PPP policies; processes; and procedures and acts as a national center of expertise in PPP. The ICRC monitors the effectiveness of the FGN's policies and processes and provides independent advice to the Federal Executive Council on the development of projects through the PPP route (ICRC, 2012). The ICRC works closely with state governments that are developing their own PPP policies to ensure consistency; best practice; and a coordinated approach to the private sector supplier market. Consequently, the ICRC maintains a PPP project database and also retains custody of all PPP agreements as required by legislation (ICRC, 2012). Having created enabling environment for PPPs in Nigeria, many infrastructure projects such as airport, seaports, roads, rails, power and energy, markets complex development, university hostel development, affordable housing and offices among others have been executed through PPPs.

2.10 PPP institutional framework in Nigeria

A sound institutional framework conducive to PPPs that ensures government commitment, transparency, predictability, and coherence, is a major determinant of private investor engagement in PPPs (World Bank, 2011a). Figure 2.6 illustrates the PPPs institutional

framework in Nigeria. The institutional framework indicates how specific roles and responsibilities are allocated to various entities, and how the entities are harmoniously working together with the federal government in PPP process. In order to make sure that there are checks and balances in the system, as well as oversight of the decision-making process, many federal government entities are involved in the PPP process from beginning to the end. Figure 2.6 is presented on the next page.

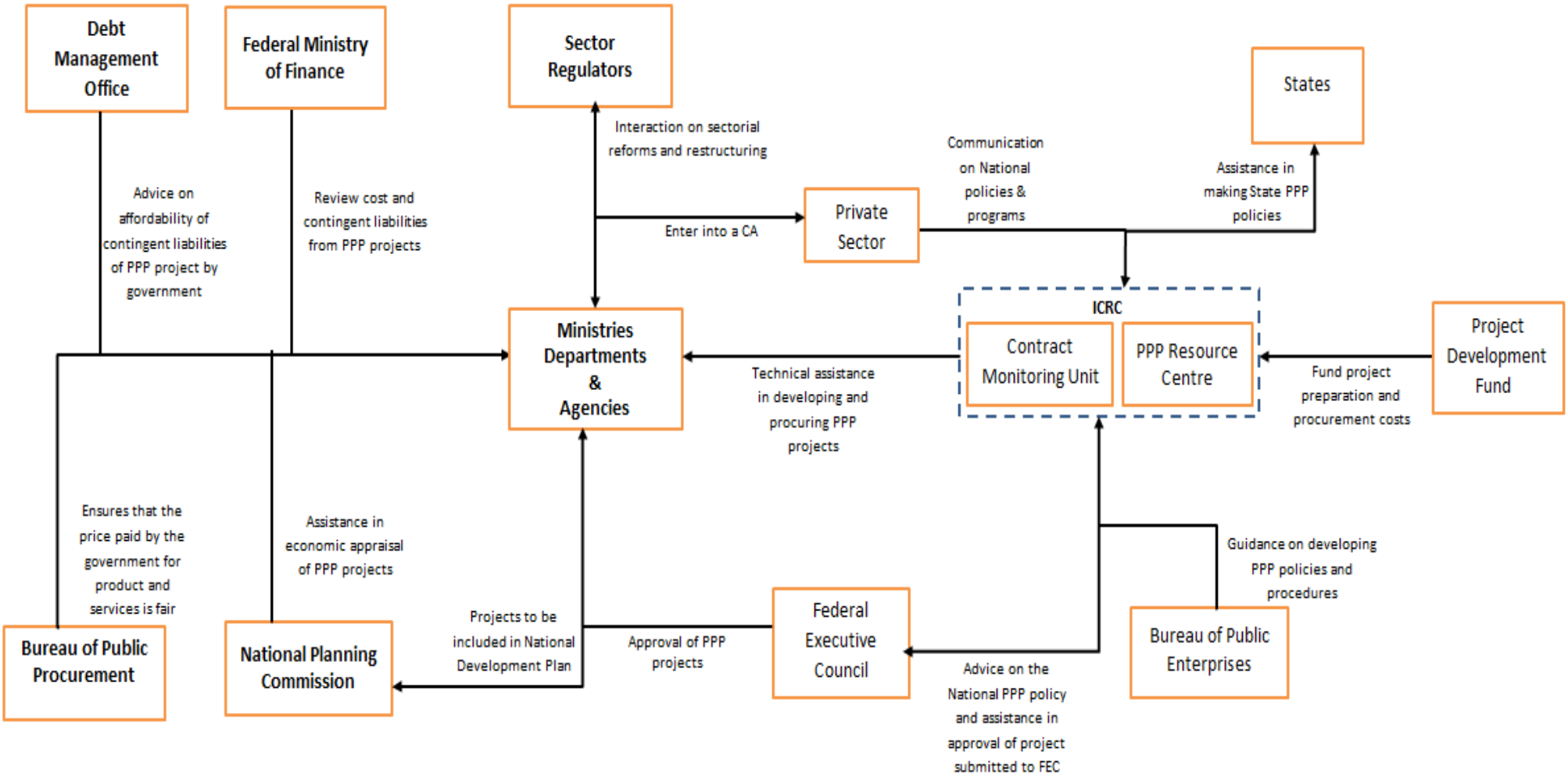


Figure 2.6: Nigeria's PPPs institutional framework (Source: ICRC PPP manual for Nigeria, 2012, p.22)

It can be deduced from Figure 2.6 that the PPPs institutional framework in Nigeria is arguably cumbersome. For instance, it encompasses many agencies of federal government and federal executive council (i.e. political class). PPP arrangement is complex itself that involve various participants with diverse interests (Grimsey & Lewis, 2002; Thomas *et al*., 2006) and combines with this type of institutional framework operating by federal government agencies in Nigeria, there is certainty of conflict of interests among the political class, delays in reaching consensus of opinion, administrative bottleneck among others. This corroborated by Babatunde *et al*. (2014) found that during the construction of Lekki-Epe Expressway toll road concession in Lagos, Nigeria, it took longer than necessary for the Lagos state government to secure the execution of the federal government support agreement, which resulting in delay at implementation phase of the concession of Lekki-Epe Expressway. Also, it is documented that PPP infrastructure projects implementation in Nigeria is characterised by controversies, delays, litigations and revocations of concessions agreement (see Lucas, 2011; ICIR, 2012). This occurred due to the inadequate experience of the public authorities (i.e. ministries, department, and agencies) regulating PPPs in Nigeria, and private sector most notably indigenous concessionaires (Ahmed, 2011; ICIR, 2012). UNDP (2005) reports that public and private partners' capacity deficiencies affect partnership arrangements in developing countries. Thus, the greater the capacity of the public and private sectors in PPPs, the more likely succeeds in developing and sustaining effective PPPs (UNDP, 2005). It is against this backdrop that this research becomes imperative to develop a capability enhancement framework for the public and private sector organisations involved in PPP infrastructure projects in Nigeria.

2.11 Maturity models in the construction industry

Some studies have been conducted on maturity models in the construction industry. For instance, Sarshar *et al*. (2000) undertake research called Structured Process Improvement in Construction Enterprises (SPICE) to understand the applicability of the principles of CMM in the construction industry. The SPICE project aimed at improving processes on individual construction projects. Keraminiyage *et al*. (2006) present a conceptual framework for the construction higher capability maturity level dynamics. Keraminiyage *et al*. (2007) identify higher capability maturity KPAs (Key Process Areas) of construction organisations. Sun *et al*. (2009) conduct a study on a change management maturity model for construction projects. Eadie *et al*. (2011) identify the KPAs for an e-capability maturity model for construction organisations in the UK. Eadie *et al*. (2012) develop measures to capture

capability maturity of ICT applications in the construction industry among others. Saleh & Alshawi (2005) argue that there are some different models which can be used to establish the maturity of a system. Therefore, the maturity models applied to project management in the construction industry are presented in Table 2.4 as follows:

Table 2.4: Maturity models applied to project management in the construction industry

Name	Abbreviation	Domain	Developed by
Capability Maturity Model	CMM	Software and systems engineering adopted in Project Management	Software Engineering Institute (SEI) of the Carnegie-Mellon University between 1986 and 1993
Project Excellence Model	PEM	Project Management	EFQM 1996
Kerzner Project Management Maturity Model	KPM3	Project Management	Kerzner, 1997
Structured Process Improvement in Construction Enterprises	SPICE	Project Management	Construct IT, 2000 (University of Salford)
Project Management Maturity Model	PM3	Project Management	PMI 2001
Structured Process Improvement in Construction Enterprises-Facilities Management	SPICE FM	Facilities Management	Construct IT, 2001 (University of Salford)
Project Management Process Maturity Model	PM2	Project Management	Kwak & Ibbs 2002
Organisational Project Management Maturity Model	OPM3	Project Management	PMI, 2003
Portfolio, Programme and Project Management Maturity Model	P3M3	Portfolio, Programme and Project Management	OGC, 2003
PRINCE 2 Maturity Model	P2MM	Project Management	OGC, 2004
Standardised Process Improvement for Construction Enterprises	SPICE	Project Management	SCRI, 2005 (University of Salford)

It is evident from Table 2.4 that some maturity models are in existence and applied to project management in the construction industry with a view to improving productivity and attains quality gains. However, contributions of these maturity models to PPP projects implementation received scant attention. It is against this backdrop that necessitated this research to develop a process maturity in PPP projects using the concept of CMM.

2.12 Capability maturity model (CMM) concept

Capability maturity concept has its origin in quality process improvements and traces back to Crosby (1979) studies in the late 1970's. Paulk *et al*. (1993) state that Capability Maturity Model (CMM) was first developed in the software industry by the Carnegie Mellon University as a framework to inspect capability maturity of software providers. Fraser *et al*. (2002) affirm that the modern day capability maturity concept gained its popularity based on the software CMM, initiated in the early 1990's in the USA. Eadie *et al*. (2011) assert that since 1991, many CMMs have been developed and recognised internationally. Therefore, the concept of CMM is increasingly applied in many disciplines. For example, software engineering, manufacturing, project management in the construction industry among others as a means for both the assessment and a roadmap for improvement (Fraser *et al*., 2002; Yeo & Yen, 2009). This is corroborated by Software Engineering Institute (SEI) (2010) that CMMs focus on improving processes in an organisation. However, a similar application on stakeholder organisations involved in PPP projects implementation across the world is limited. Considering this awareness, there is a need for a framework to be developed using the CMM concept to assess the current maturity of stakeholder organisations in PPP infrastructure projects. The framework would provide the roadmap for continuous improvement to guarantee the long-term success of PPP infrastructure projects implementation in Nigeria, and developing countries at large.

Today, the CMM has metamorphosed to become CMMI, where "I" denotes "Integration" of System or Software Engineering (SEI, 2010). This research adapts CMMI concept out of some maturity models available (see Table 2.4). The rationale for adopting CMMI is that it provides a step-by-step framework, which enables organisations to assess where they positioned within the framework and then provides guidelines on what are their process improvement priorities (see Paulk *et al*., 1993; Hutchinson & Finnemore, 1999; SEI, 2010). It is also due to its huge recognition by the industry and academia. For instance, notable earlier researchers in construction management and economics have adopted CMMI for their studies and have been published in reputable refereed journals (see Sarshar *et al*., 2000; Keraminiyage *et al*., 2006; Keraminiyage *et al*., 2007; Sun *et al*., 2009; Eadie *et al*., 2011; Eadie *et al*., 2012) among others.

2.12.1 **CMMI process areas**

CMMI identify 22 generic process areas and describes it as a cluster of related practices in an area with a view to making improvement in that area (SEI, 2010). The identified 22 process areas in CMMI are classified into four. This includes process management, project management, engineering, and support. The concept of process capability maturity within an organisation is presented as models, which comprise several maturity levels (Keraminiyage *et al*., 2007). Therefore, the maturity level is described as an evolutionary plateau for organisational process improvement (SEI, 2010). In CMMI, there are five maturity levels, and each level provides for process improvement in an organisation. Within CMMI, this research focuses on process management and that is what the five maturity levels refer to in this study. Thus, the five maturity levels are represented by the numbers "1 to 5", and presented in Figure 2.7 as follows:

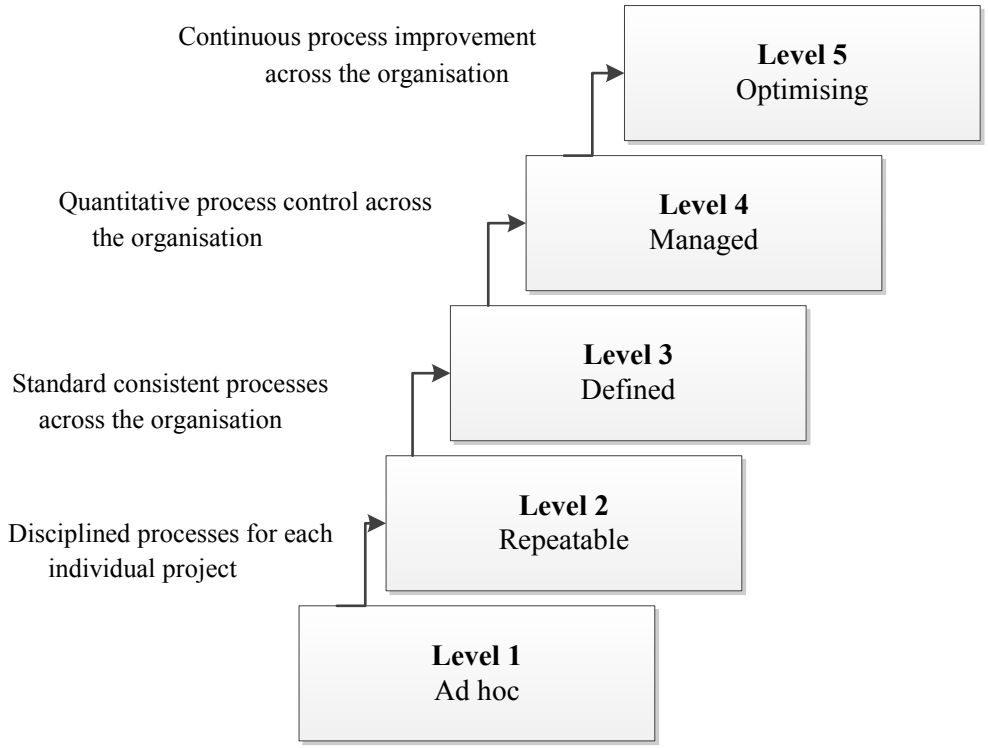


Figure 2.7: SPICE framework (Adapted from Sarshar *et al*., 2000, p.243)

As shown in Figure 2.7, the maturity levels are in ascending order that indicates that organisation that intends to advance to higher levels as to fulfil higher capability levels criteria.

2.12.2 **Characteristics of capability maturity levels**

Curtis *et al*. (2002) assert that excluding maturity level 1, all other maturity levels (i.e. level 2-level 5) are characterised by a set of interrelated practices. Therefore, it is necessary to

understand the peculiarities of each maturity level (i.e. level 1- level 5) as depicted in Figure 2.7. The five maturity levels are named as ad hoc, repeatable, defined, managed, and optimising (see Figure 2.7). The characteristics of each maturity level are briefly discussed as follows:

2.12.2.1 Level 1—Ad hoc

Some earlier researchers also called this level initial (Curtis *et al*., 2002). Whatever this level is called either ad hoc or initial, it is referred to as immature (Sarshar *et al*., 2000). Organisations at this level usually have difficulty in retaining talented individuals, processes are chaotic, results are unpredictable, and project success depends on individual efforts within the organisations (Curtis *et al*., 2002; Kwak & Ibbs, 2002; Keraminiyage *et al*., 2007).

2.12.2.2 Level 2—Repeatable

Organisations at this level have the likelihood to predict the project (Sarshar *et al*., 2000). In level 2, processes are established and practises/activities are carried out in line with organisation policy (SEI, 2010; Office of Government Commerce OGC, 2010). The practices undertaken are unit level issues including establishment of commitments, resources and training are provided, and responsibilities are assigned among others (Curtis *et al*., 2002; SEI, 2010, PRINCE 2, 2012). The establishment of a strong unit for practices guarantee more sophisticated practices at higher levels of maturity.

2.12.2.3 Level 3—Defined

At level 3 standard processes, methodologies among others are established within the organisation (SEI, 2010). These standard practices are used to establish consistency across the organisation (SEI, 2010). Sarshar *et al*. (2000) assert that organisation at level 3 develops the capability to capture and share best practices. This is affirmed by Curtis *et al*. (2002) that maturity level 3 helps an organisation gaining competitive advantage with the development of different competencies to achieve organisation and business strategies. Therefore, an organisation at level 3 has established an organisational framework for developing its workforce.

2.12.2.4 Level 4—Managed

At level 4, tools and database are in use, and predictions are made, based on statistical analysis (Crawford 2006; SEI, 2010; APSC, 2012; PRINCE 2, 2012). Therefore, the

organisation is managing its capability and performance quantitatively (Curtis *et al*., 2002; SEI, 2010; OGC, 2010; PRINCE 2, 2012). This capability is sustained and used as criteria in managing projects and other activities (Curtis *et al*., 2002; SEI, 2010).

2.12.2.5 Level 5—Optimising

This is the most mature level; therefore, organisation focuses on continual improvement through incremental and innovative process (Curtis *et al*., 2002; Kwak & Ibbs, 2002; Keraminiyage *et al*., 2007; SEI, 2010; OGC, 2010; PRINCE 2, 2012). At this stage, individuals are empowered to improve their process, organisation capturing lessons learned and feedback loop in place. In addition, both qualitative and quantitative approaches are adopted by organisation to understand the variations inherent in the process (Paulk *et al*., 1993, 1995; Curtis *et al*., 2002; SEI, 2010; OGC, 2010; PRINCE 2, 2012). The summary of each maturity level characteristics is presented Table 2.5 as follows:

Table 2.5: Summary of capability maturity levels characteristics

Maturity Levels	Coding ref.	Characteristics	Source
Level 1: Ad Hoc	ML1/Ah-C1	Processes are usually ad hoc and chaotic.	Sun *et al*., 2009; SEI, 2010; Keraminiyage *et al*., 2009; Niazi *et al.,* 2003;Crawford, 2006; PRINCE 2, 2012; Kaur, 2014.
	ML1/Ah-C2	The organisations do not provide a stable environment to support processes/No formal processes available.	SEI, 2010; Kaur, 2014.
	ML1/Ah-C3	Success in organisations/projects success depends on individuals efforts.	Kwak & Ibbs 2002; Sun *et al,.* 2009;Keraminiyage *et al*., 2009; Lianying *et al*., 2012; OGC, 2010; PRINCE 2, 2012.
	ML1/Ah-C4	Organisations often produce products and services that work, but they frequently exceed the budget and schedule documented in their plans.	Sun *et al*., 2009; OGC, 2010; PRINCE 2, 2012.
	ML1/Ah-C5	Organisations are characterised by a tendency to abandon their processes in a time of crisis, and be unable to repeat their successes.	SEI, 2010; OGC, 2010; PRINCE 2, 2012.
	ML1/Ah-C6	Organisations are unaware of the need for the task to be undertaken.	Yeo & Yen, 2009.
	ML1/Ah-C7	Organisations have no/little understanding of the importance of process/task to be carried out.	Yeo & Yen, 2009
	ML1/Ah-C8	Organisations make no attempt to recognise the benefit of the task/process to be conducted.	Yeo & Yen, 2009; APSC, 2012.

Maturity Levels	Coding ref.	Characteristics	Source
	ML1/Ah-C9	Organisations have no tools and database in use.	Yeo & Yen, 2009; APSC, 2012; OGC, 2010.
	ML1/Ah-C10	Organisations paid lip service to the task/process that is being carried out.	Yeo & Yen, 2009.
Level 2: Repeatable	ML2/Re-C1	Organisations ensured that processes were introduced/developed, planned, and executed by policy.	Kwak & Ibbs 2002; Keraminiyage *et al.*, 2009; SEI, 2010; Paulk *et al.,* 1993; Kaur, 2014; OGC, 2010; PRINCE 2, 2012.
	ML2/Re-C2	Skilled people are employed that have adequate resources to produce controlled outputs.	Paulk *et al*., 1993; SEI, 2010; PRINCE 2, 2012.
	ML2/Re-C3	Relevant stakeholders are involved.	Paulk *et al.,* 1993; SEI, 2010.
	ML2/Re-C4	Projects are monitored, controlled, reviewed, and evaluated for adherence to their process descriptions.	Sun *et al.,* 2009; SEI, 2010; Lianying *et al.,* 2012;PRINCE 2, 2012.
	ML2/Re-C5	Status of the work products are visible to management (e.g., meeting milestones)/Pockets of good practice.	Crawford, 2006; OGC, 2010; PRINCE 2, 2012.
	ML2/Re-C6	Relevant stakeholders commitments are established and revised as the need arise(s). For instance, training and resources are provided, responsibilities are assigned among others.	SEI, 2010; Lianying *et al*., 2012; OGC, 2010; PRINCE 2, 2012.
	ML2/Re-C7	Recognition of the importance of task/process to be carried out.	APSC, 2012.
	ML2/Re-C8	Organisation has a clear role, achievable, and measurable strategy in place.	Lianying *et al*., 2012; APSC, 2012.
	ML2/Re-C9	Weak team orientation and organisation good at doing repetitive works.	Kwak & Ibbs, 2002; Yeo &Yen, 2009; Lianying *et al*., 2012; Paulk *et al*., 1993.
	ML2/Re-C10	Simple template and spreadsheet are used for some activities.	Yeo &Yen, 2009.
Level 3: Defined	ML3/De-C1	Processes are well understood and described in standards, procedures, and methods.	Curtis *et al.,* 2002; OGC, 2010; PRINCE 2, 2012; APSC, 2012; Kaur, 2014.
	ML3/De-C2	The organisations established standard processes and improved over time.	SEI, 2010; PRINCE 2, 2012; APSC, 2012.
	ML3/De-C3	Standard processes are used to establish consistency across the organisation.	Sun *et al.,* 2009; OGC, 2010; PRINCE 2, 2012; APSC, 2012; Kaur, 2014.
	ML3/De-C4	Processes are more rigorous and managed more proactively.	Kwak & Ibbs, 2002; Sun *et al*., 2009; Paulk *et al*., 1993; OGC, 2010; PRINCE 2, 2012; APSC, 2012.
	ML3/De-C5	A defined process clearly states the purpose, inputs, entry criteria, activities, roles, measures, verification steps, outputs, and exit criteria.	OGC, 2010; PRINCE 2, 2012; Kaur, 2014.
	ML3/De-C6	Tools and database are in place.	Yeo & Yen, 2009; APSC, 2012.

Maturity Levels	Coding ref.	Characteristics	Source
	ML3/De-C7	Pockets of best practice are evident.	Yeo & Yen, 2009; APSC, 2012.
	ML3/De-C8	Organisations are strongly recognised/understood the importance of the task/process undertaken.	APSC, 2012.
	ML3/De-C9	Reasonably high team orientation/work.	Yeo & Yen, 2009.
	ML3/De-C10	Task orientation management.	Yeo & Yen, 2009.
	ML3/De-C11	Organisations provide strong support to the process/task undertaken.	Sun *et al*., 2009; Kaur, 2014.
Level 4: Managed	ML4/Ma-C1	Organisations established quantitative objectives for quality and process performance and used them as criteria for managing projects.	Paulk *et al*., 1993; Kwak & Ibbs , 2002; Curtis *et al.,* 2002; Lianying *et al*., 2012; OGC, 2010; PRINCE 2, 2012.
	ML4/Ma-C2	Tools and database are in use for statistical analysis.	SEI, 2010; APSC, 2012.
	ML4/Ma-C3	Predictions are partially based on a statistical analysis.	Curtis *et al*., 2002; SEI, 2010; Crawford, 2006; PRINCE 2, 2012.
	ML4/Ma-C4	Processes are aligned to the organisation's strategic objectives and priorities.	Kwak & Ibbs, 2002; OGC, 2010; PRINCE 2, 2012; APSC, 2012.
	ML4/Ma-C5	Specific measures of process performance are collected and statistically analysed.	SEI, 2010; Crawford, 2006; PRINCE 2, 2012.
	ML4/Ma-C6	Organisations conduct post -project reviews and performance reporting.	OGC, 2010; PRINCE 2, 2012.
	ML4/Ma-C7	Processes are regularly and formally reviewed with input from other stakeholders.	Yeo & Yen, 2009.
	ML4/Ma-C8	Strong teamwork, even with external partners.	Kwak & Ibbs, 2002; Yeo & Yen, 2009; APSC, 2012.
	ML4/Ma-C9	Strong project-driven organisation.	Kwak & Ibbs, 2002; Yeo & Yen, 2009; APSC, 2012.
	ML4/Ma-C10	Organisational flexibility and willingness for change, and adaptive leadership and management style.	Yeo &Yen, 2009; APSC, 2012.
	ML4/Ma-C11	Processes are strongly recognised and support. Organisations define means for improvement.	APSC, 2012.
	ML5/Op-C1	Organisation uses a quantitative approach to understand the variation inherent in the process.	Paulk *et al*., 1993; Curtis *et al*., 2002; SEI, 2010; PRINCE 2, 2012.
	ML5/Op-C2	Organisation focuses on continually improving process performance through the incremental and innovative process and technological improvements.	Kwak & Ibbs, 2002; Keraminiyage *et al.,* 2007; Paulk *et al*., 1993; Crawford, 2006; SEI, 2010; OGC, 2010; APSC, 2012; Kaur, 2014.

Maturity Levels	Coding ref.	Characteristics	Source
Level 5: Optimising	ML5/Op-C3	Organisation's quality and process performance objectives are established and continually revised.	SEI, 2010; Kaur, 2014.
	ML5/Op-C4	The process improvements are measured using statistical and other quantitative techniques.	SEI, 2010.
	ML5/Op-C5	Capture lessons learned and feedback loop.	OGC, 2010; PRINCE 2, 2012; APSC, 2012.
	ML5/Op-C6	Processes are kept up to date and measurable benefits.	APSC, 2012
	ML5/Op-C7	Enlightened leadership and management style. Strong matrix or projected.	Yeo &Yen, 2009; PRINCE 2, 2012; APSC, 2012.
	ML5/Op-C8	The strong project-driven organisation, dynamic, and flexible.	Kwak & Ibbs, 2002;Yeo & Yen, 2009; Lianying *et al*., 2012; APSC, 2012.
	ML5/Op-C9	Leverage the good relationship with other stakeholders and develop a societal network and community relations.	Yeo & Yen, 2009.
	ML5/Op-C10	Using sophisticated tools for both qualitative and quantitative analyses.	Yeo &Yen, 2009; APSC, 2012.
	ML5/Op-C11	Organisation's set of standard processes and supporting technology is targeted at measurable improvement activities.	Sun *et al.,* 2009; Yeo &Yen, 2009.

Table 2.5 shows the detail characteristics of each maturity level 1-5 including their respective coding reference. For example, maturity level 1 is coded in the colour red as 'ML1/Ah-C1- ML1/Ah-C10', where 'ML1'signifying maturity level 1; 'Ah'-signifying Ad hoc; and 'C1-C10' indicating criteria 1-10. In the same vein, maturity level 2 is coded in colour blue as 'ML2/Re-C1- ML2/Re-C11', 'ML2' indicating maturity level 2; 'Re'-indicating Repeatable and 'C1-C11' signifying criteria 1-11 (see Table 2.5 for details). Also, Table 2.5 shows 53 characteristics altogether for the five maturity levels. Thus, the identified characteristics were used to develop the conceptual framework (see Section 8.2 & 8.3 in Chapter 8 for details).

2.13 PPP market maturity

Over 40 countries that have adopted PPPs for delivering public infrastructure facilities and services are at different stages of PPP market maturity. Deloitte (2007) reports that PPPs market maturity are influencing some factors. These factors include culture; political climate; and capital market among others. The effects of these factors vary from one country

to another. Thus, the PPP market maturity in selected countries around the world is revealed through the research undertaken by Deloitte (2007). The PPP market maturity curve is presented in Figure 2.8 as follows:

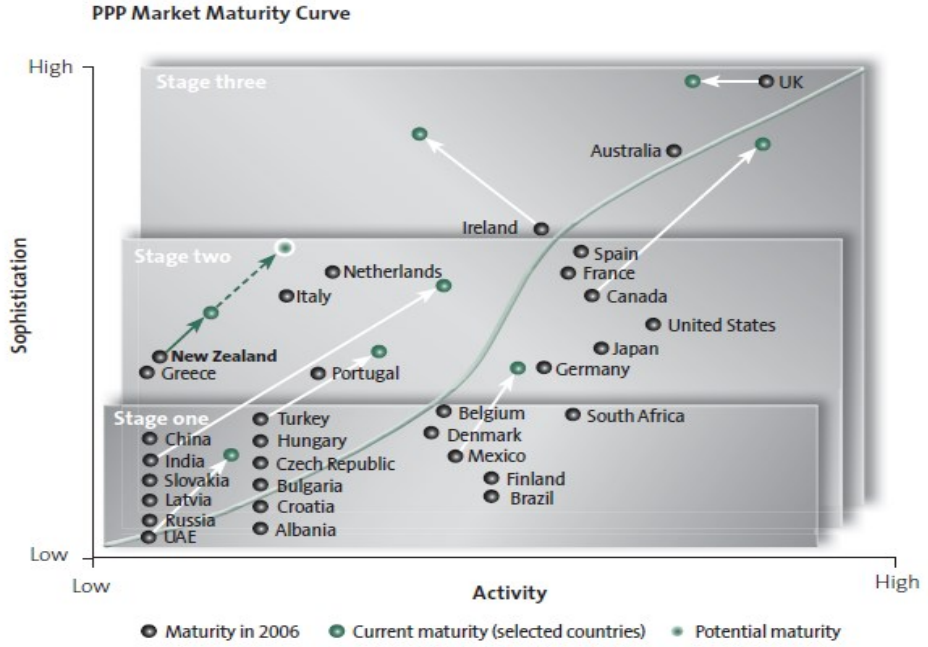


Figure 2.8: PPP market maturity curve in different countries (Source: Deloitte, 2007, p. 9).

Figure 2.8 indicates three stages of PPP market maturity. This includes: low; sophistication; and high. Office of the Auditor-General New Zealand (2011) interprets the three stages of PPP market maturity as: developing PPP market; active PPP market; and mature PPP market. Thus, Figure 2.8 reveals that the UK, Australia, and Ireland are in stage three which is interpreted as well-functioning and most mature PPP market. Few countries in Europe, United States, Canada, New Zealand, and Japan are in stage two, which is tagged as the active PPP market. Also, few countries in emerging and developing countries are in stage one called the developing PPP market or low PPP market. PPP market maturity by Deloitte (2007) was developed using critical success factors and numbers of PPP projects executed in each country captured in their study (see Figure 2.8). However, some countries that have a long history in PPPs and even recorded huge success using PPP for infrastructure projects implementation were not captured, for example, Turkey, China, Malaysia, Thailand among others. Also, with particular reference to transportation, many countries including Spain, South Korea, Canada, United States, Ireland, France, China and Brazil have moved on since the 2007 Deloitte research report described as the PPP market maturity curve (see Figure 2.8). In Africa, only South Africa appeared in Deloitte's PPP market maturity (see Figure 2.8), it is not surprising that Nigeria was not captured, because Nigeria PPP market started

gaining attention from 2007 till today. Currently, Nigerian governments (both federal and states) had undertaken some infrastructure projects using PPPs.

In line with Deloitte (2007), the approach of using critical success factors (CSFs) to develop maturity models has many champions. For instance, Fortune & White (2006) assert that CSFs are the best known approach for tackling the human and organisational aspects of projects. Niazi *et al*. (2003) argue that CSFs are used to establish a baseline to formulate a means for the maturity of the process. Yeo & Ren (2009) argue that process maturity is mainly dependent on the key capability areas extracted from CSFs. Ali & Kidd (2013) state that the identification of CSFs help practitioners to work on areas responsible for the success of a process. Niazi *et al.* (2003) further emphasis on the identification of CSFs is the measure to provide guidelines for improvements. Therefore, the study conducted by Deloitte (2007) uses CSFs to develop PPP market maturity for selected countries across the globe, but the author not prioritised the CSFs into the maturity of stakeholder organisations involved in PPP projects implementation. It is against this backdrop that necessitated this research using CSFs to develop a stakeholder organisations capability enhancement framework (SOCEF) in PPP projects in Nigeria. In addition, primary stakeholder organisations in both the public and private sectors already involved in PPP projects implementation to include public sector authorities, concessionaires, local lenders/banks, consultants, and contractors are assessed to know their current capability maturity levels in respect to CSFs that made PPP infrastructure projects successful in Nigeria

2.14 Chapter summary

In this chapter, a comprehensive literature review was conducted to provide background knowledge on PPPs development, selected relevant theories to PPP, capability maturity model (CMM) among others. It is revealed that governments across the world have found partnerships with the private sector as an attractive alternative to increasing and improve the supply of public infrastructure facilities and services. The reviewed findings further indicated that the UK is most proponents of PPPs in the world. This chapter has also provided a theoretical base for this research study. For example, an extensive literature review findings identified some theories applicable to PPPs. Thus, the most appropriate theories to this study are the x-efficiency theory; stakeholder theory; and governance theory. This chapter further revealed that enabling environment that encompassed enabling legislation; social; administrative; good governance among others are essential for PPPs implementation to be successful in any country. Further review was conducted on PPPs

practice in selected countries across the globe, PPPs in Nigeria. Also, CMM and its applicability in the construction industry were reviewed. The findings revealed that some maturity models are used to establish maturity of a system. For example, in the construction industry SPICE, P3M3, P2MM among others are identified as maturity models applied to project management, but limited contributions of these maturity models to PPP projects implementation. Therefore, it becomes imperative to review how PPP infrastructure projects are being financed. This necessitated the next chapter to provide insight on the needs for financing infrastructure projects, financing mechanisms for PPP infrastructure projects, the concept of infrastructure projects among others.

Chapter 3: PPP INFRASTRUCTURE PROJECTS FINANCING

3.1 Introduction

Studies have emphasised the importance of infrastructure as an enabler for developing an economy, and the fact is that vast segments of existing infrastructure in the developed world are becoming deficient, and in developing countries existing infrastructure are worrisome. Countries need to develop sustainably, long-term models to fund the development, expansion, replacement, or renewal of their national and regional infrastructure. Unfortunately, governments are facing challenges in accessing funding for infrastructure development. Therefore, the role of private financing in the provision of infrastructure is becoming increasingly critical to ensure that inadequate infrastructure does not become a bottleneck for economic growth and social progress (WEF, 2010). It is against this backdrop that this chapter focuses on the need for financing infrastructure projects, financing mechanisms for PPP infrastructure projects, private participation in infrastructure, concept of infrastructure project, the Nigerian economy, the Nigerian construction industry, and current state of infrastructure in Nigeria among others.

3.2 The need for financing infrastructure projects

The demand for infrastructure development and the maintenance of existing infrastructure caused by economic growth and population increase has in many instances, overtaken the capacity of national governments to provide the necessary finance (Howes & Robinson, 2005). The development of a good physical and social infrastructure is characterised by significant investment requirements. Thus, to avoid cost and time overrun, and benefit from innovative project structuring and implementation strategies, private sector participation in the development of infrastructure is extremely critical (Ernst & Young, 2012). Many studies have been conducted regarding governments' inability to raise massive funds for large-scale infrastructure projects that can be mitigated by private participation (Cheung *et al*., 2009). Private participation is preferable if the country lacks resources to deliver important public services such as healthcare, transportation, energy (Regan, 2009). Addressing infrastructure project investment, execution, management concerns among others necessitated the UK to introduce PFI in 1992. Later on governments around the world sought to encourage private investment in national infrastructure to reduce public debt and to increase efficiency while minimising costs (Howes & Robinson, 2005).

In developing countries, a key factor influencing the economic growth is the amount and quality of infrastructure provided for transport, water, power, waste disposal, education, and health. The provision is costly and normally requires expertise and resources that are often not available locally (Howes & Robinson, 2005). Developing countries have huge requirements for infrastructure development to support growth, reduce poverty, and improve living standards. There is an urgent need to increase funding for capital and recurrent investment to improve or slow down the deterioration of existing infrastructure. Therefore, there is a need for substantial funding to address infrastructure deficits in the developing world. For instance, International Finance Corporation (IFC) reports that developing countries require more than US$3 trillion for investment in new infrastructure over the next 10 years. Estimate for developing the Asian region range from US$1 to US$2 trillion; US$600 billion for Latin America; while Eastern Europe and Africa also need heavy capital infusions for infrastructure development (Howes & Robinson, 2005). The inadequacy of infrastructure in Africa is widely recognised. For instance, in Sub-Saharan Africa (SSA) the finance required to raise infrastructure to a reasonable level within the next decade is estimated at US$93 billion per year (World Bank, 2011a). Given this, the only approach to addressing this challenge is to facilitate the increase of private provision of public infrastructure services through PPPs.

3.3 Financing mechanisms for PPP infrastructure project

PPP infrastructure project involves financing from a number of sources, sometimes combination of equity and debt contributions. World Bank (2011b) reports that the ratios of equity and debt contributions depend on negotiations between the lenders and the shareholders. The main sources of financing PPP infrastructure projects are briefly discussed as follows:

Equity contributions: In the context of PPP, World Bank (2011b) reports that sponsor funding is generally through equity distributions. Demirag *et al*. (2010) describe equity as a financial instrument junior to senior debt. World Bank (2011b) further reports that equity can be provided by either the project sponsors or independent private equity funds. Demirag *et al*. (2010) claim that pure equity in the PPP deal is usually10% of total equity.

Debt contributions: Ernst & Young (2012) report that debt can be obtained from commercial lenders, institutional investors, export credit agencies, and sometimes from the host country

government among others. Demirag *et al*. (2010) argue that PPP deals are highly geared, in which senior debt is about 90% of the total finance.

Bond/capital market financing: World Bank (2011b) reports that bond financing allows the borrower to access debt directly from institutions without using commercial lenders as intermediaries. Demirag *et al*. (2010) assert that once construction risks have been largely mitigated, bond financing is commonly used for refinancing.

Mezzanine/subordinated contributions: Mezzanine contribution is a form of financing that combine elements of debt and pure equity financing (Vasilescu & Popa, 2006; Vasilescu, 2010). European Commission (2007) reports that mezzanine instrument can be in different forms. For instance, it can be a subordinated loan, a participating loan, silent participation, profit participation rights, a convertible bond, and a bond with warrants. The uses of mezzanine contributions allow the project company to maintain greater levels of debt to equity ratio in the project (Vasilescu & Popa, 2006).

***Multilateral and bilateral funding*:** This explored when governments lack sufficient resources to fund infrastructure projects, governments either cancel or delay the projects, or alternatively turn to an external source to acquire loans for the purpose of making the shortfall (Howes & Robinson, 2005). Development agencies are classified as multilateral where governments contribute to an international organization such as the World Bank. Bilateral is where a single country has a specific programme to assist less well of countries. Examples of multilateral are: International Finance Corporation (IFC); European Investment Bank (EIB); International Bank for Reconstruction and Development (IBRD)/ World Bank; Asian Development Bank (ADB); United Nations Development Program among others.

Foreign investment funding/ foreign direct investment (FDI): UNCTAD (2013) reports that FDI flows to developing economies proved to be much more resilient than flows to developed countries, recording their second highest level – even though it declined slightly (by 4 per cent) to US$703 billion in 2012. It accounted for a record 52 per cent of global FDI inflows, exceeding flows to developed economies for the first time ever by US$142 billion. The global ranking of the largest recipients of FDI in 2012 is presented in Figure 3.1 on the next page.

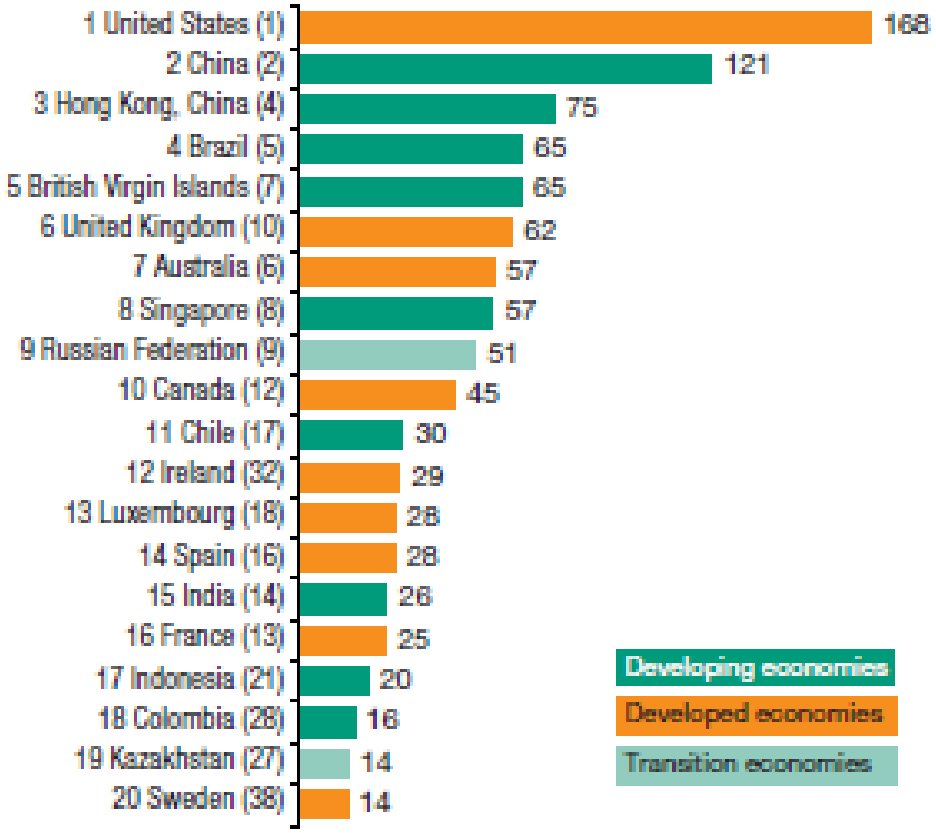


Figure 3.1: Global ranking of largest recipients of FDI in Billions of US Dollars (Source: UNCTAD, 2013, p.xiv)

The Figure 3.1 indicates that 9 of the 20 largest recipients of FDI in 2012 are developing countries. Among the regions, flows to developing Asia and Latin America remained at historically high, but their growth momentum weakened (UNCTAD, 2013). Going by these trends, FDI has significantly contributed to infrastructure financing across the globe.

Pension funds/Insurance funds and others: There are numerous potential alternative sources of financing infrastructure projects ranging from state development banks to sovereign wealth funds (SWFs), as well as institutional investors such as pension funds, insurance funds, mutual funds and endowments (Stewart & Yermo, 2012; Ernst & Young, 2012; Sanusi, 2012). Institutional investors could play a more active role in financing infrastructure in the future (Stewart & Yermo, 2012). Studies revealed that over US$70 trillion in assets held at the end of 2010 in OECD countries. Institutional investors could be key sources of capital with long-term financing, lower default rates, and predictable cash flows among others (Stewart & Yermo, 2012; Ernst & Young, 2012; Sanusi, 2012).

The emerging Africa infrastructure fund ('EAIF'): Ncube (2010) claims that EAIF provides long-term debt or mezzanine finance on commercial terms in Africa. EAIF can provide between US$ 10 million - US$ 36.5 million to finance infrastructure projects. Examples of

special banks for infrastructure financing in some countries are Brazilian Development Bank (BNDES), Infrastructure Development Finance Company of India (IDFC), and Development Bank of South Africa among others. Consequently, European Investment Bank (EIB) (2010) provides a structure of financing mechanisms for PPP infrastructure projects as follows:

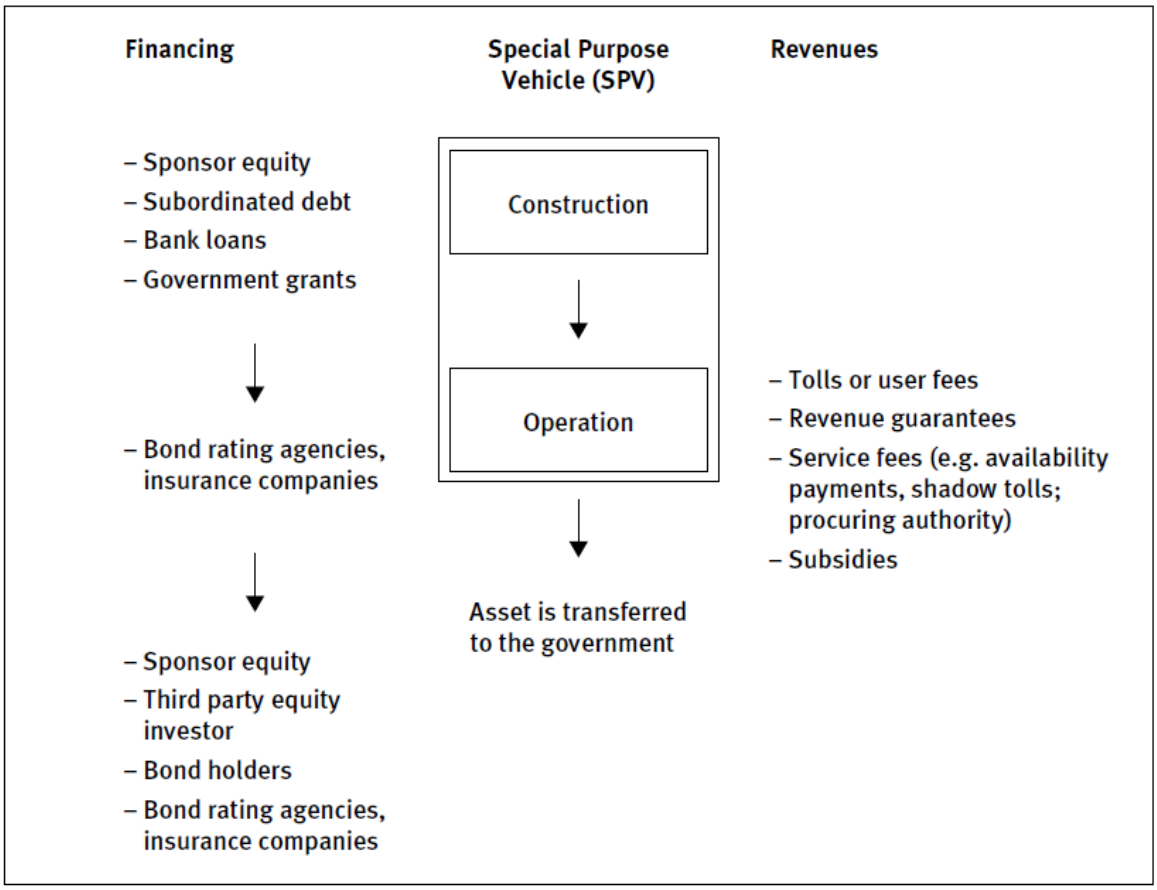


Figure 3.2: Financial life cycle of a PPP infrastructure project (Source: EIB, 2010, p.45)

3.3.1 Comparisons of the benefits of financing mechanisms of PPP infrastructure projects

Selected literature on benefits of each identified financing mechanism for PPP projects are presented in Table 3.1 on the next page.

Table 3.1: Benefits of identified financing mechanism for PPP projects

S/n	Benefits	References
1	**Equity contributions**	
i.	It has the highest returns.	Afzal, 2010; Sharma, 2010; World Bank, 2011b; Das, 2012.
ii	It is a good source of long-term finance.	
iii	There is no fixed burden.	
iv	It is credit worthiness.	
v	The personal properties of the investors are not at stake.	
2	**Debt contributions**	
i.	It is tax-deductible- lower the tax liability every year.	Heath, 1991; De Thomas, 1992; World Bank 2011b; Peavler, 2013.
ii	It allows investors to have full control of his/her company and the profit made.	
iii	It provides a greater degree of financial freedom.	
iv	It is easy to administer-it generally lacks the complex reporting requirements.	
v	Debt obligations are limited to the loan repayment period.	
vi	Debt that is paid on time can enhance credit rating and make it easier to obtain various types of financing in the future.	
3	**Bond/capital markets financing**	
i	It provides lower interest rates.	EIB, 2010b; Demirag *et al*., 2010; World Bank, 2011b.
ii	It can be used for the raising of long term finance.	
iii	It is used for refinancing at the construction phase.	
iv	It is very attractive.	
v	There is a greater certainty to ascribe a lower cost to liquidity risk.	
4	**Mezzanine/subordinated contributions**	
i.	It improves the balance sheet structure.	Glen, 2006; Vasilescu & Popa, 2006; Vasilescu, 2010; Vasilescu, 2011.
ii	It offers a better access to additional financial sources.	
iii	It strengthens capital structure without the need for diluting equity holdings.	
iv	It offers tax-deductible interest payments and flexible conditions.	
v	It is a supplement to the traditional forms of corporate financing for firms.	
vi	It provides stability of financing given its long-term availability.	
vii	It is very flexible and useful for business expansion, business transfer, innovation, and public to private transactions.	
viii	Repayments are often not required until maturity.	
ix	Optimal opportunities for diversification.	
5	**Multilateral and Bilateral funding**	
i.	Provision of public sector loans to the national or regional government for financing grants/ equity support.	Howes & Robinson, 2005; Andreopoulo *et al*., 2011; Ernst & Young, 2012;
ii	Provision of private sector loans to project companies.	
iii	Provision of guarantees to commercial lenders.	
iv	Provision of long-term foreign capital	
v	Transparency in the origin and allocation of funds.	
vi	Global governance: it tends to adhere to widely-shared principles, standards, and procedures.	
vii	Political neutrality and needs-driven: it tends to be less tied to	
viii	the political interests of individual donor countries	
ix	Higher participation and resources: funding from international	

S/n	Benefits	References
	organisations is huge and allows more efficient allocation of resources.	
6	**Foreign direct investment (FDI)**	
i. ii iii iv v vi vii viii ix	It has proved to be resilient during financial crises. It allows money to go freely to whatever business that has the best prospects for growth anywhere in the world. Global mobility of capital prevents recipient government in pursuing bad policies. It allows quick implementation. The risk involved is reduced. It allows diversification. Businesses benefit by receiving management, accounting or legal guidance in keeping with the best practices practiced by their lenders. It provides training for the employees: it incorporates the latest technology, innovations in operational practices, and new financing tools. Host country benefits from profits generated by FDI through corporate tax revenues.	Loungani & Razin, 2001; Thadani, 2011; De Silva, 2011; Ernst & Young, 2012; Amadeo, 2013.
7	**Innovative/ Alternative financings (E.g. Sovereign Wealth Funds (SWFs); Pension funds; Insurance funds; Mutual funds and endowments; Special taxes to support infrastructure development; and Establishment of infrastructure banks**	
i. ii iii iv v vi	It provides long-term streams of income. It has lower default rates. Predictable cash flows. Constancy and certainty of receiving the funds. Sustainability of the strategy in the long run. It eliminates some financial risks such as the fluctuation of the exchange rate and inflation.	Beeferman, 2008; Ncube, 2010; World Bank 2011b; Stewart & Yermo, 2012; Ernst & Young, 2012; Sanusi, 2012; Belt & Nimmo, 2013.

3.3.2 Comparisons of the shortcomings to financing mechanisms of PPP projects

Despite the numerous benefits that each financing mechanism poses, there are still shortcomings. These are presented in Table 3.2 as follows:

Table 3.2: Shortcomings of selected financing mechanisms for PPP projects

S/n	Shortcomings	References
1	**Equity contributions**	
i ii iii iv v vi vii viii ix	It bears the highest risk. Uncertain and irregular income/fluctuation in market price. The capital loss during depression period. Loss on liquidation. No flexibility in capital structure. Over-capitalisation. Dilution in control. There are various statutory restrictions. The investor is limited to the extent of the investment made	Afzal, 2010; World Bank 2011b; Das, 2012.

S/n	Shortcomings	References
2	**Debt contributions**	
i.	Difficulties in obtaining long-term finance.	World Bank, 2011b; Ernst & Young, 2012; Peavler, 2013.
ii	Commercial banks low capacity to finance infrastructure projects.	
iii	Lack of experience of local commercial banks in project financing.	
iv	High-interest rates.	
v	Problems of foreign exchange.	
vi	Too much reliance on banking sector for infrastructure financing can lead to asset liability mismatch.	
vii	Reduction of the availability of credit and limit leverage.	
viii	Unfamiliar with limited recourse financing structures.	
ix	There is a risk of bankruptcy	
3	**Bond/capital markets**	
i.	Interest is charged on the entire amount from day one.	World Bank, 2011b; EIB, 2010b; Ernst & Young, 2012.
ii	Less certainty in the underwriting process due to the volatility in the securities market.	
iii	Less flexible during project implementation.	
iv	Disclosure processes are cumbersome.	
v	Bonds/capital markets in most developing countries and emerging markets are highly underdeveloped.	
vi	Inadequate export credit agency and other support for bonds.	
vii	Lack of benchmarking of bonds/capital markets.	
viii	The poor trade volume of bonds.	
ix	Lack of a reliable government.	
x	Inadequate knowledge of the bond market on the part of the public sector and private sponsors.	
xi	Institutional bond investors have no in-house capability to carry out the transaction development and negotiation functions.	
xii	There is possibility that funds may not be available, or available at uncompetitive prices.	
xiii	The transaction costs associated with bond financing are higher.	
4	**Mezzanine/subordinated contributions**	
i.	It is more expensive.	Vasilescu, 2010; Vasilescu, 2011; World Bank, 2011b.
ii	It is difficult to obtain due to strict transparency requirements.	
iii	It is medium risk.	
iv	Mezzanine funds are generally made available for a limited period of time.	
v	It is unsuitable for financing restructurings.	
vi	Difficulty of exit early.	

S/n	Shortcomings	References
5	**Multilateral and Bilateral funding**	
i. ii iii iv v	It is very competitive (not automatic in securing it). There is tendency for donor's countries to place strict political and economic conditions on the recipient countries, e.g. IMF austerity programs and structural adjustment policies in the developing countries is an example of imposing harmful conditions on the recipient countries A delay of the funds to reach the intended destinations. It is highly bureaucratic. It becomes a burden on recipient's countries to pay back due to accumulated interest rates.	Andreopoulo *et al*., 2011; World Bank, 2011b.
6	**Foreign direct investment (FDI)**	
i. ii iii iv v vi	It takes the longer time to set up. Sophisticated foreign investors can use their skills to strip the company of its value without adding any. Loss of control by the host country. High travel abroad and communications expenses. There is the possibility of language and cultural barriers between the investor and the host country. Domestic firms may suffer if they are relatively uncompetitive	Loungani & Razin, 2001; Thadani, 2011; De Silva, 2011; World Bank, 2011b; Amadeo, 2013.
7	**Innovative/ Alternative Financings: Sovereign Wealth Funds (SWFs); Pension funds; Insurance funds; Mutual funds and endowments; Special taxes to support infrastructure development; and Establishment of infrastructure banks**	
i. ii iii iv v vi	Inadequate staff to actively manage the lending. It is susceptible to bias based on political interference/priorities. Some projects are untested and have low credit rating. Some pension fund investment regulations allow for investment in infrastructure projects, to date no investments have been made, particularly in African countries. The small size of the insurance industry in developing countries compared to developed countries. Lack of a large private pension system.	Beeferman, 2008; World Bank, 2011b; Belt & Nimmo, 2013.

3.4 Private participation in infrastructure (PPI)

Private finance is not new to infrastructure investment, it has a long history of contributing to help bridge financing gap (WEF, 2010). The World Bank's Public-Private Infrastructure Advisory Facility (PPIAF) estimates that private participation in infrastructure in low and middle-income countries has average 1 per cent of national GDP since 2003 (World Bank, 2008). Figure 3.3 illustrates trends in private infrastructure investment in developing countries from 1990 to 2008. Organisation for Economic Co-operation and Development

(OECD) and the World Bank estimate the investment need for infrastructure development could be around US$3 trillion per annum globally (or close to 5 per cent of current global GDP) which approximately US$1 trillion per annum needs to be spent in developing countries (WEF, 2010).

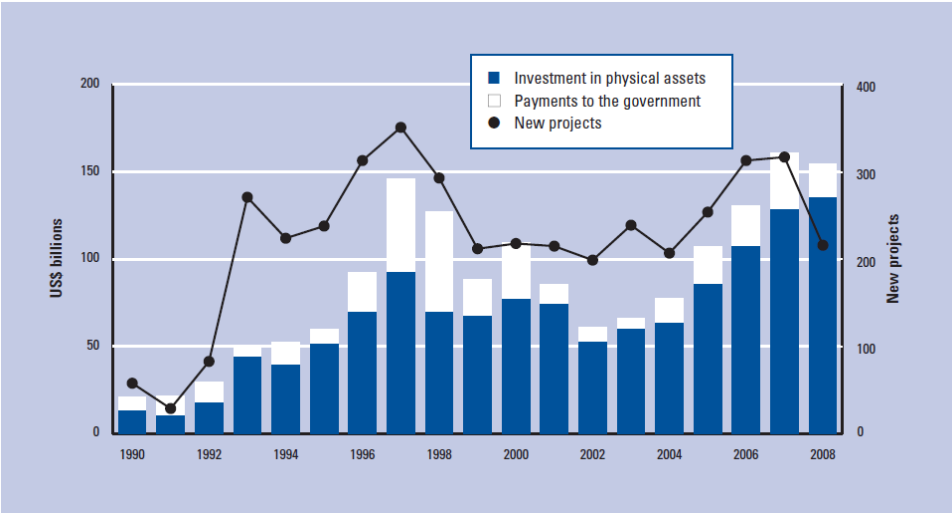


Figure 3.3: Investment commitments to infrastructure projects with private participation in developing countries, by investment type (1990–2008) (Source: World Bank, 2008, slides 7)

In many developed economies, private finance has been making an increasingly significant contribution to infrastructure development, in particular, social infrastructure through PPPs (WEF, 2010). For example, in the United Kingdom which has one of the most highly developed PPP programs the government estimates that over £100 billion in private-sector investment has been made in infrastructure in the last 10 years (HM Treasury, 2009). In this context, private-sector investment in social infrastructure PPPs represents 10 to 15 percent of the United Kingdom's total investment in public services in 2005–2006 (HM Treasury, 2006a). Ernst & Young (2007) suggest that global private investment in infrastructure was around US$1 trillion. WEF (2010) reports that if it is estimated that investment need is around US$3 trillion per annum globally, and private investment in infrastructure is around US$1 trillion, then the financing gap is US$2 trillion per annum as presented in Figure 3.4 on the next page.

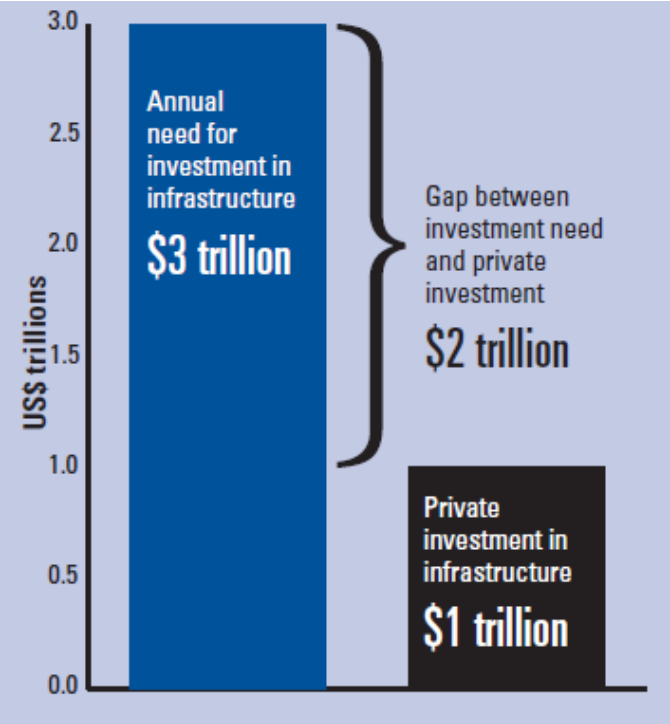


Figure 3.4: Gap between need and private investment in infrastructure globally (source: WEF, 2010, p. 9)

It is apparent that governments alone cannot be able to fund all infrastructures from the public purse without a fundamental shift in budget priorities and an increase in taxation (WEF, 2010).

3.5 Overview of the Nigerian economy

Nigeria is a middle income, mixed economy, and emerging market, with expanding financial, service, communications, and entertainment sectors (AfDB, 2003). Nigeria government is making all efforts to become one of the world's top 20 economies by 2020. AfDB (2012) reports that the major challenges for the Nigerian economy are: the dilapidated state of infrastructure, widespread corruption, and the over-dependence on the oil and gas industry. The government at all levels are making efforts in attracting more private sector for infrastructure development and developing the non-oil sector. AfDB (2012) undertakes country's policy and institutional assessment, their result indicates that Nigeria has made significant reforms, particularly in public financial management to improve efficiency in resource allocation, project and programme implementation, and the concerted efforts to fight corruption. In 2011, the Nigerian economy grew at an estimated real rate of 7.36 percent (see Figure 3.5). This was slightly lower than the 7.98 percent recorded in 2010.

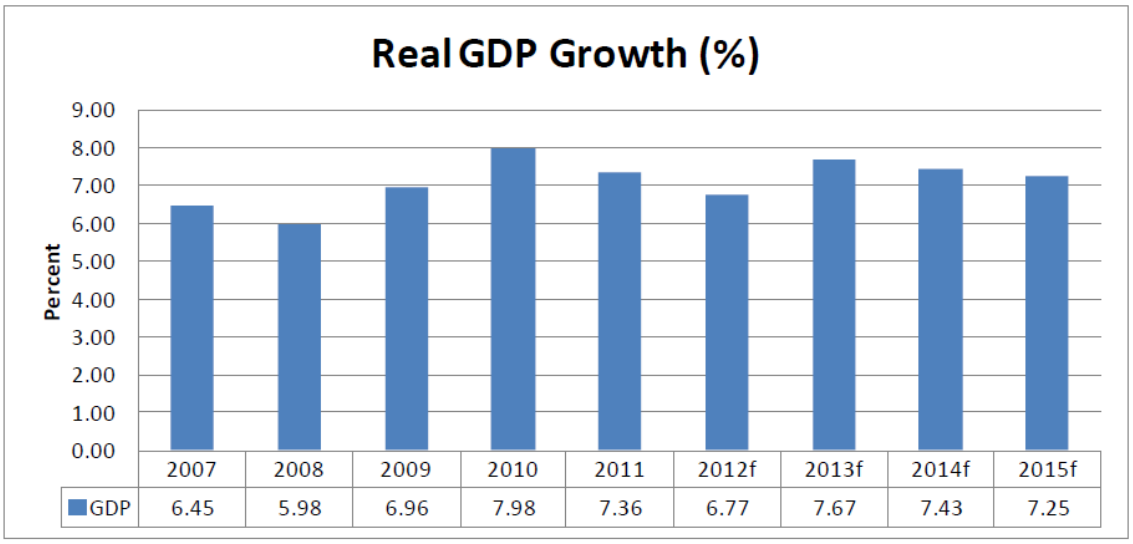


Figure 3.5: Actual and projected growth rate of GDP in Nigeria (2007-2015) (Source: NBS, 2012, p.16)

GDP grow by 6.17 percent in the first quarter and 6.28 percent in the second quarter of 2012 as against 7.13 percent and 7.61percent in the corresponding quarters of 2011 (NBS, 2012). The decrease in GDP growth recorded in the first half of 2012 was as a result of slower growth in both oil and non -oil sectors (notably agriculture and wholesale and retail trade sector). For instance, in the first half of 2012, the average daily production of crude oil was estimated at 2.37 million barrels per day (mbpd), as against 2.48 mbpd produced in the first half of 2011. The decline of 4.4% in crude production levels was attributed to disruptions in production due to cases of oil theft and vandalisation in the oil producing areas. Agriculture is typically slower in 2012 due to security challenges. The security challenges in some northern states of the country which affected movement of farmers and in some cases, the relocation of their farm lands, coupled with flooding in some areas of the country contributed to the further decline in agricultural productivity (NBS, 2012).

Figure 3.6 indicates the sectoral contributions to GDP in 2010 to 2012. Analysis of sectoral contributions to GDP in 2012 indicates that there are declines in the contribution of the agricultural sector and crude petroleum and natural gas sector (see Figure 3.6 for details).

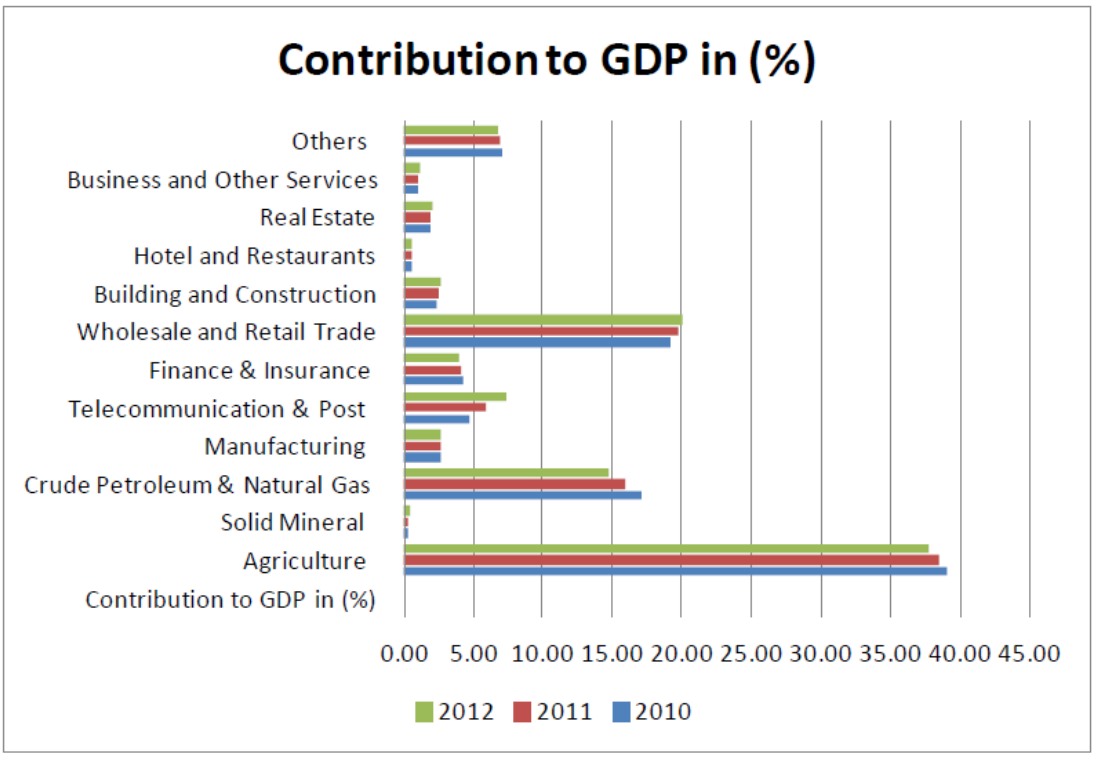


Figure 3.6: Sectoral contributions to GDP in 2010 - 2012 (Source: NBS, 2012, p.9)

It is apparent from Figure 3.6 the sectors that recorded positive contribution to GDP includes telecommunication and post followed by wholesale and retail, building and construction, as well as manufacturing, and solid minerals with marginal contributions to GDP as at 2012. NBS (2012) reports that the growth rates obtained from the Bayesian Vector Auto Regression model for other projected years are 7.67 percent in 2013; 7.43 percent in 2014; and 7.25 in 2015 (see Figure 3.5). While the non-oil sector experienced some shocks in 2012, it is expected that the industry will continue to be the primary driving growth. Key underlying sectors will continue to be telecommunications, wholesale and retail trade, building and construction, and hotels and restaurants which have exhibited double-digit growth over 2010 and 2011.

3.6 The Nigerian construction industry

Nigeria construction industry is primarily comprised the organised formal sector and unorganised informal sector. The formal sector encompasses foreign/expatriate and indigenous firms that are classified into small, medium and large based on their number of employees, annual turnover among others (Oladapo, 2007). The large firms are dominated by international construction firms, and they account for about 5 percent of the total number of construction firms in the formal sector. They control about 95 percent of the construction market (Oladapo, 2007). For instance, Vetiva (2011) reports that Julius Berger Nigeria Plc

remains the market leader, as it controls a large chunk of public sector construction, but with the entrant of Chinese Construction giants (China Civil Engineering Construction Company) the dominance of Julius Berger faces a significant threat in the long term. PCNCP (1989) reports that between the 1960s and 1980s the construction industry was the major contributor to Nigeria's GDP, accounted for about 70 percent of the GDP. This made the industry very strategic to the nation's development efforts. Regrettably, the Nigerian construction industry is bedevilled by low productivity and poor performance, since the decline of the national economy started at the end of the 1980s (Aniekwu, 1995; Adeyemi *et al*., 2005).

The Nigerian construction sector performed below expectations between 1981 to late 1990's (Aibinu & Jagboro, 2002). The only period of the boom between 1980's and 1990's was in early 1980's when the sector accounted for 6% of the Nation's GDP (Aina & Wahab, 2011). At the beginning of 2000, the sector's GDP contribution was around 1%-2% (Bamisile, 2004). Despite a 9% growth in the sector as a result of on-going national economic reforms, the sector's contribution has only increased by 1% (Aina & Wahab, 2011). In spite of this, it is obvious that the industry is yet to realise its potential and contribution to economic growth in a significant manner. The Nigerian construction sector accounted for 1.4% of national GDP in 2010 compared to a contribution to GDP of 4% in South Africa; 5% in Kenya; 6% in Egypt; 13% in China; and about 8.5% in the UK (Alitheia, 2011; Vetiva, 2011).

3.7 Concept of infrastructure project

The term infrastructure is often ambiguous as it is widely used in different context (Howes & Robinson, 2005). For instance, infrastructure tends to be used to refer to a broad range of things from military installations, information technology, buildings to physical networks such as transportation and water systems. Snieska & Simkunaite (2009) claim that there is no specific definition of infrastructure, though economists in their early studies stressed that transport infrastructure is crucial for economic development. World Bank (2004) reports that infrastructure is an umbrella term for many activities, it plays a critical role in the industrial and the overall economy. WEF (2010) reports that any definition of infrastructure needs to take into account both the money flows into and the risk and reward nature of infrastructure. This means that any definition needs to capture the fact that infrastructure opportunities are usually capital-intensive and include a tangible asset that must be operated and maintained to generate stable, long-term cash flows.

Scandizzo (2007) argues that infrastructure is a prerequisite for increased access to global trade and investment flows, increasing competitiveness and sustaining regional growth. World Bank (2004) reports that improved infrastructure reduce transportation costs, expanding markets, and reducing distances between production and consumption centres among others. Howes & Robinson (2005) assert that infrastructure is central to the household, community, and economic activities. They are important to facilitate human development, economic growth, and productivity in industry. The links between infrastructure services, growth, and social outcomes operate through multiple channels are depicted in Figure 3.7 as follows:

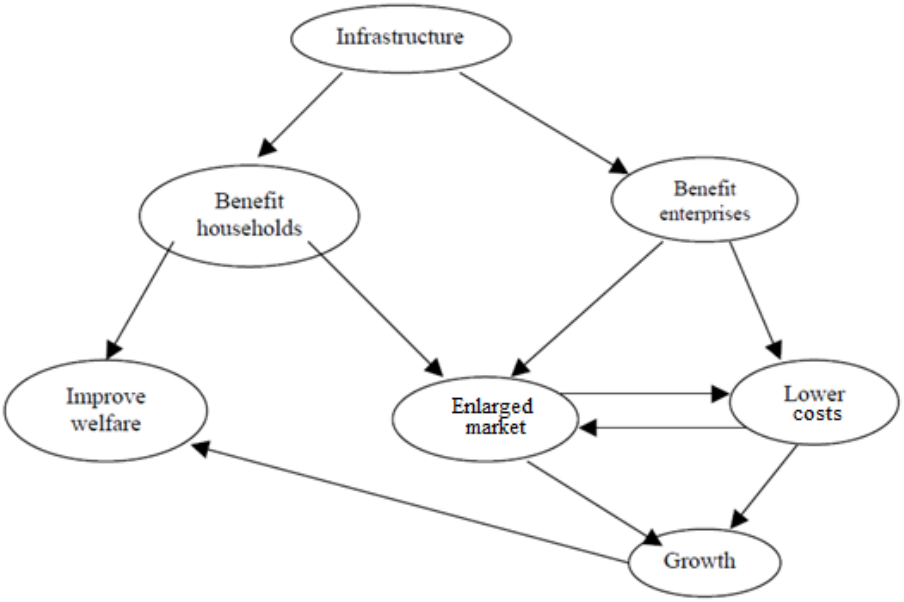


Figure 3.7: How infrastructure contributes to development (Source: World Bank, 2004, p.4)

Recent reviews of funds on infrastructure globally by WEF (2010) shows some infrastructures targeting at different sectors, as illustrated in Figure 3.8. The fact that many funds are allocated to energy, transport, water, roads, and renewable energy suggests that these are the sectors offering the most investment opportunities, and also the sectors that provide assets that best fit the long- term stable profile that many investors desire (WEF, 2010) (see Figure 3.8 for details).

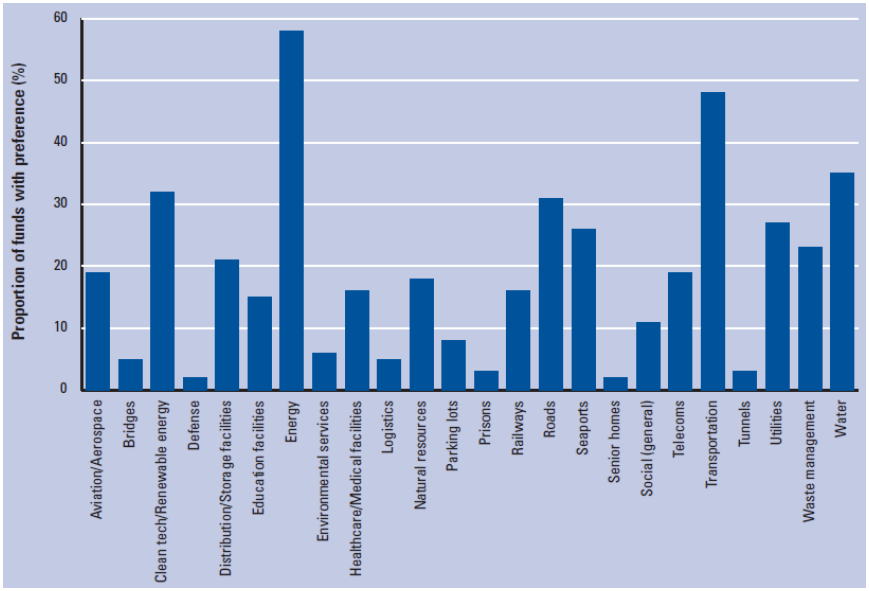


Figure 3.8: Infrastructure investment preferences in global context (Source: WEF, 2010, p.64)

3.7.1 **Current state of infrastructure in Nigeria**

The development of infrastructure in Nigeria has primarily been through the traditional form of the contract award by federal, state, and local governments through budgetary allocations (AfDB, 2010). This accounts for the failed, abandoned, and collapsing of infrastructure in many parts of the country and made it difficult by competing demands from other sectors for government's limited resources (AfDB, 2010). The state of Nigeria's infrastructure has been a subject of debate by stakeholders in the economy in recent times (Lucas, 2011). For instance, Nigeria currently has a total road network of 194,200 kilometres which comprise 34,123km federal roads; 30,500km state roads; and 129,577km local government roads (Vetiva, 2011). Only about 30% of Nigeria's 194,200 km total road network is paved, relative to an average of 70% and 58% for frontier and emerging markets respectively (Ahmed, 2011; Vetiva, 2011; Sanusi, 2012). The gap is wider when compared with advanced economies with an average paved road network of 100% (Vetiva, 2011). Given this, there is an enormous opportunity for road infrastructure development in Nigeria, given that approximately 70% total road network is unpaved and perhaps un-motorable. In Nigeria, road development has historically been the government's responsibility. Recently, the private sector through PPP is beginning to participate in road infrastructure.

Deficiency in rail infrastructure is even worse, as Nigeria's existing 3,500km rail network is grossly insufficient (AfDB, 2010; Vetiva, 2011). Rail transportation is generally in a dilapidated state, and most of the available wagons and locomotives are defective and in

poor conditions. This mode of transportation currently accounts for less than 1% of the land transportation in the country, thus, putting the roads under significant pressure from heavy haulage (Vetiva, 2011). In the last four years, the government appears to have taken major steps in developing rail transportation by commissioning several projects in rail construction. The infrastructure availability in Nigeria compared to few selected countries is presented in Table 3.3 as follows:

Table 3.3: Infrastructure availability in selected countries

Nation	Population	Area	Stock Infrastructure				
	Millions	Km^2	Telecoms Millions of subscribers	Electricity (MW)	Rail (km)	Roads (km)	*Airports
Netherlands	16.72	41,543	27.23	9170	2811	135,470	22
Brazil	179.10	8 ,514 , 877	191.78	86020	28, 875	1,751,868	718
Turkey	96.81	783,562	83.32	18900	8,697	426,951	90
India	1166.08	3287,263	464.84	76170	63,327	3,316,425	251
Nigeria	140.00	923,768	64.27	3000	3,500	194,200	22

Note: *Paved civil commercial airports
(Adapted from African Development Bank (AfDB), 2010)

Also, despite the improvement made over the last 10 years in airport infrastructure, particularly Nnamdi Azikwe Airport, Abuja and Muritala Mohammed Airport Terminal 2 Lagos, airport infrastructure in Nigeria cannot be compared with other African countries especially Egypt and South Africa (Vetiva, 2011). For example, Nigeria has 4 international airports (out of 22 airports), and South Africa has 3 international airports. Based on 2009 figure, South Africa's Johannesburg airport and Egypt's Cairo airport had annual passenger traffic of about 16 million and 14 million respectively compared to combined annual passenger traffic of about 10.2 million for Nigeria's 4 international airports (Vetiva, 2011). In the case of seaports, there are 13 major ports; 11 oil terminals; and 128 jetties with a total annual cargo handling capacity of about 35 million tonnes (Vetiva, 2011). Given the problems of inefficiency and the resultant port congestion, the government commenced the reform and restructuring of the ports to introduce private sector participation in 2001. In April 2006, private operators took over as terminal operators of the sea ports, after a competitive bidding process, with the Nigerian Ports Authority (NPA) focusing on its role as the "Landlord". The port reforms birth the first major PPP in infrastructure development and

currently there are about 19 terminal operators managing Nigerian seaports in partnership with the NPA.

In the case of power, inadequate electricity supply has also proved to be the major infrastructure constraint confronting the people and business sector in Nigeria (Adenikinju, 2000). Electricity supply is both unstable and of very low quality. This has contributed to the low productivity and low competitiveness of the Nigerian manufacturing sector (Adenikinju, 2003). Also, Ahmed (2011) concludes that US$13 billion is spends annually on fuelling power generators. The deficit of infrastructure in Nigeria has compounded other challenges such as low GDP growth, limited GDP per capita growth, unemployment, stagnancy in the non-oil economic sector, poor public service delivery, and a general increase in poverty levels (AfDB, 2010). Having highlighted the current state of few physical infrastructure in Nigeria, particularly roads, rail, airports, ports, power (electricity), the Nigerian governments are making unrelenting efforts to ameliorate the key infrastructure challenges through a number of reforms. For instance, the power sector reform among others, and the rising acceptance of involvement of the private sector in infrastructure development via PPPs. This is supported by Adetola *et al.* (2011) that PPPs have become increasingly popular in delivering large transportation projects such as roads, bridges, tunnels, railways, seaports, and airports. In the same vein, the deficit of social infrastructure comprising the housing, education facilities, hospitals, offices and markets complex, water and sanitary infrastructure projects to mention a few in Nigeria is huge, due to the growing population of about 170 million. This triggered both the national and regional governments to start addressing its social infrastructure deficit through PPPs most especially housing delivery (see Ibem, 2010; Ibem, 2011; Oladokun & Aluko, 2012). However, others social infrastructure is not well documented.

3.7.2 Rationale for PPPs in Nigeria

PPPs are effectively applied to deliver infrastructure projects that would otherwise be out of the reach of available public funds. Apart from other drivers for adopting PPP in the world, few additional reasons for Nigerian government for adopting PPPs are elucidated as follows:

Corruption in public procurement: Corruption in public contracting raises overall project costs, undermines donor support, and has serious implications for the achievement of social objectives (Institution of Civil Engineers, 2005 cited in Babalola *et al*., 2010). A survey conducted in the year 2000 revealed that before 1999, Nigeria was losing an average of

US$270 million annually through various kinds of manipulations of the procedure for award and execution of public contracts (Wahab, 2000). These manipulations are in the forms of "inflating the contracts costs, use of contracts system to divert public funds to private pockets, award of contracts for non-existent projects, use of inexperienced contractors, over-invoicing, influence peddling, award of contracts to friends, relations and family members, and award of contracts without adequate planning and budgetary provisions" (Wahab, 2000). It is on this premise that Babalola *et al*. (2010) assert that infrastructure development can only be achieved if the resources (manpower, money and time) lost to public procurement due to lack of financial probity are eliminated.

Budgetary constraints: In Nigeria, the state of infrastructure challenge is huge, and the country requires US$10 billion annually for the next ten years to achieve the infrastructure requirements (Sanusi, 2012). Unfortunately, Nigerian government budgets cannot solely develop infrastructure. For example, the cost implication for the first National Implementation Plan (NIP) is US$212 billion; this is clearly beyond government budgetary capacity (AfDB, 2010).

Inefficiencies in traditional procurement: Jin & Doloi (2007) assert that the conventional provision of infrastructure funded by the government has led to inefficiencies and subjected infrastructure development to the availability of government funds. Public infrastructures delivered through the traditional procurement have faced some challenges. These include: persistent cost overruns; construction delays; poor workmanship; contractor claims for additional payment; operational performance shortfalls among others (Flyvbjerg *et al*., 2003; Van Wee, 2007; Siemiatycki, 2009).

Lack of skills and expertise in public sector: The public sector lacks skill and expertise to develop solely infrastructure, this accounts for the failed; abandoned or collapsing infrastructure in many parts of the country (AfDB, 2010). The inadequate capacity in managerial and technical expertise in the public sector is continuously hindering the ability of the nations to meet her demand (Gidado, 2010). The greater demand for public services and the lack of expertise in the public sector makes it difficult for the government to cope. Therefore, Nigerian government has no option but to partner with the private sector to provide first–class public services and infrastructure (Gidado, 2010). In line with global trends, both the federal and state governments of Nigeria have decided to explore PPP as a priority option to meet its infrastructure development needs.

3.8 Chapter summary

This chapter provided a comprehensive review of the need for financing infrastructure projects and financing mechanisms for PPP infrastructure projects among others. The review findings indicated that the development of a good infrastructure is characterised by significant investment requirements. The review findings further identified equity contribution, debt contribution, bond/capital market, mezzanine/subordinated contribution, multilateral and bilateral funding, foreign direct investment (FDI) among others as financing mechanisms for PPPs infrastructure project. The review finding also indicated that there is growing embrace of private sector involvement in infrastructure development all over the world. The concept of infrastructure was extensively studied, and the results revealed that PPPs model are commonly used for the implementation of both social and economic infrastructure across the globe. It was also revealed by a review of literature that there is a strong relationship between infrastructure and development This led to a conceptual framework that shows how infrastructure contributed to development. The infrastructure investment preference showed that many funds are allocated to energy, water, roads, and energy. This suggested that these sectors offering the most investment opportunities and provides assets that best fit long term profile that many investors desire.

This chapter further provided background information on the Nigerian economy. The reviewed findings indicated the actual and projected annual growth rates for GDP in Nigeria ranging from 2007-2015. Findings further revealed that Nigerian construction sector is performing below expectation with the contribution of 1.4% to national GDP compared to South Africa, Kenya, Egypt, China, and the UK. A comprehensive review was also conducted on the infrastructure availability and the rationale for PPPs in Nigeria. The literature review chapters would not complete without reviewing PPP infrastructure projects implementation. Thus, the next chapter critically examines PPP infrastructure projects implementation that encompasses value for money in PPPs, risk in PPP projects implementation, drivers for adopting PPPs, barriers to PPP projects implementation, and critical success factors (CSFs) for PPP projects among others.

Chapter 4: PPP INFRASTRUCTURE PROJECTS IMPLEMENTATION

4.1 Introduction

PPPs have received much attention in the development and financing of public infrastructure facilities and services in the last decade due to its inherent benefits and are now used in over 40 countries (Li *et al.,* 2005a; Leiringer, 2006; RICS Policy Report, 2012). Many countries adopted PPP for different reasons, such as the fiscal deficit, budgetary pressure, demand–supply gap among others (Chowdhury *et al*., 2011). PPPs have made significant impacts worldwide in public infrastructure development. It against this backdrop that Alfen (2010) asserts that PPP concepts had spread all over the world in various forms, and that is becoming increasingly popular both as an alternative procurement option for the public sector and a good investment opportunity for private investors. Despite the increasing adoptions of PPPs, many countries and regions are still experiencing barriers to its successful implementation (Leiringer, 2003). Thereby slow down the implementation and even diminish the interests of the private sector in PPPs (Yang *et al*., 2010). It is on this note that this chapter contains review on value for money in PPPs, drivers for adopting PPPs for infrastructure projects, barriers to implementing PPPs, and critical success factors (CSFs) for PPP infrastructure projects. The lessons learned are also being drawn from PPPs international perspective.

4.2 Value for money in PPPs

The principal justification for a PPP route is value for money (VfM) (Harris, 2003; OECD, 2008b) VfM is a primary objective in PPPs (EC, 2003). Thus, there are many factors that determine whether a project delivers VfM or not. These factors vary by type of project and sector. PPP generates improved VfM as a result of the better allocation of risk; reduced whole life costs; faster implementation; improved service quality among others (EC, 2003). Andersen & Enterprise LSE study (2000) report that achieving VfM in PPP depends on many factors including risk transfer; competition; private sector management expertise among others. This is affirmed by Fitzgerald (2004) that VfM can be achieved in PPPs through risk transfer; greater asset utilisation; innovation; and integrated whole-life management. Thus, some countries have achieved VfM using PPPs in delivering public infrastructure facilities and services. For instance, Hodge (2004) claims that cost savings of 10-20% are recorded in government department implementing PPPs in the UK. HM Treasury (2006a) reports that 50% of authorities administering PPPs received good VfM in

the UK. KPMG (2007) reports that 83% of private operators/investors in PFI/PPP projects in the UK made profits, out of which 38% realised less profit than expected. In Australia, Allen Consulting Group (2007) found that the PPP projects are completed 3.4% ahead of time compared to projects delivered through other procurement methods. It is evident that in Australia and the UK, PPPs perform better in achieving VfM in public infrastructure projects.

OECD (2008b) reports that achieving VfM in PPPs depend on appropriate identification and allocation of risks between the public and private sectors. Thus, the risks are allocated to the party that is the best equipped to manage it most cost effectively. Toth (2010) asserts that adequate risk transfer is a prerequisite for successful partnerships, and failure to do so reduce the likelihood that a PPP will be more efficient compared to traditional procurement. Optimal risk sharing between the public and private sectors is important as it creates incentives to improve risk management. Risk management can decrease project costs and failure, if optimally done may generate increased VfM. OECD (2008b) reports that the optimal amount of risk transferred to the private sector partner can be found at the point where VfM is maximized. This assertion is illustrated in Figure 4.1 as follows:

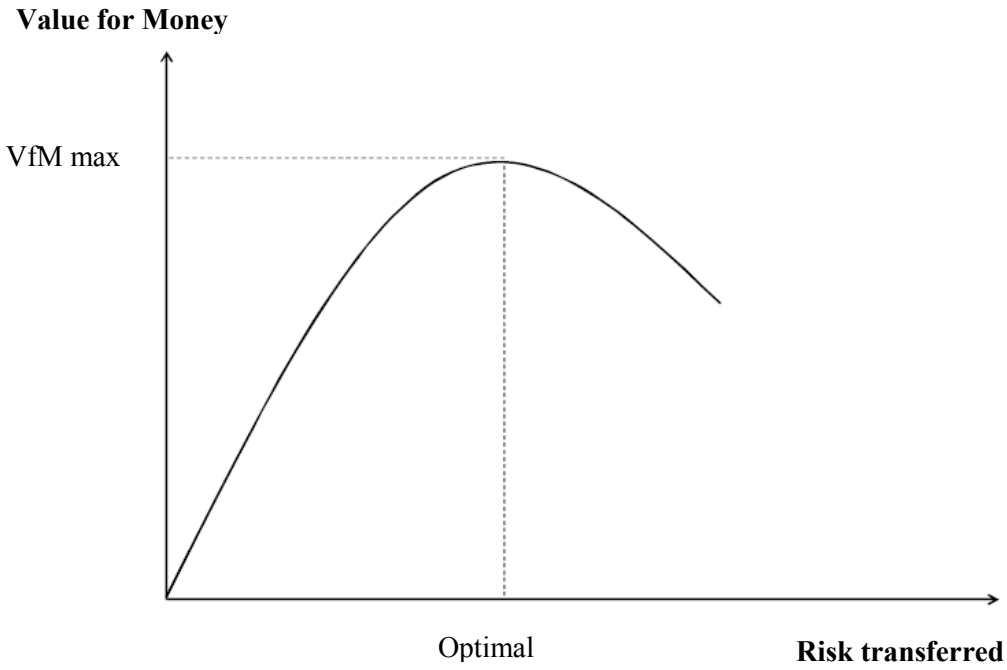


Figure 4.1: Principles of optimal risk transfer (Source: OECD, 2008, p. 33)

Therefore, ensuring optimal risk transfer as indicated in Figure 4.1 is very complex in PPPs because there are a number of risks at different stages of PPP life cycle process that have to

be taken into consideration and carefully assessed. Given this, a preliminary risk assessment should be undertaken as part of the PPP assessment.

4.3 Assessment of VfM

Generally, whenever the construction of a new public infrastructure is economically justified, and the implementation of the project is considered in the form of a PPP, the public authority further evaluate whether the PPP alternative may offer enhanced VfM compared to traditional public procurement. OECD (2008b) reports that different countries use different methods for assessing VfM. For instance, Grimsey & Lewis (2005) assert that public sector comparator (PSC) is one of the assessment tools and it is most preferred in many countries because it is less subjective and not complex compared to other assessment tools. PwC (2010) describes PSC as "a major component of VfM analysis and is a hypothetical, risk-adjusted cost estimate for a project to be financed, owned, and implemented by the public sector". Yescombe (2007) argues that PSC is an assumption about Net Present Value (NPV) cost of the project in the case of traditional procurement that then evaluated against the NPV cost of the same project carried out using PPP. The NPV cost of PPP may either be estimated, or it may as well be known if bids have been already received for it. Thus, PSC is employed in PPP projects to assist in the quantitative VfM assessment of whether the bids offer better VfM than traditional public procurement. For example, Yescombe (2007) asserts that PPP can be justified, if its NPV cost is below the NPV cost associated with traditional public procurement.

Industry Canada (2003) reports that PSC is very important tool that enables policy makers to assess the affordability of PPPs by ensuring full life-cycle costing, test the viability of projects measured by VfM, stimulate bidding competition by building trust and transparency into the bidding process among others. Despite the benefits of PSC, there are critiques against its usage. For instance, PSC is hypothetical and subjective. In this regard, any slight changes in the assumptions can lead to a manipulation regarding the results of the evaluation. OECD (2008b) reports that PSC is costly and time-consuming exercise. Yescombe (2007) raises some issues on PSC regarding the general comparability of costs, discount rate to be used, adjustments to be made for risk transfer among others between PPP and conventional procurement. It is recognised that different countries use different methods to assess VfM. For instance, Grimsey & Lewis (2005) identify four methods to assess VfM across the globe. The authors classified the methods based on their complexity. The four methods used in assessing VfM in different countries are presented in Table 4.1 as follows:

Table 4.1: Methods used in assessing VfM in selected countries

Countries	Methods used in assessing VfM			
	Complete Cost Benefit Analysis	PSC prior to bidding process	PSC after bidding process	Reliance on competitive bidding only
Germany	✓			
Netherland		✓		
Japan		✓		
South Africa		✓		
UK		✓		
Australia			✓	
United States				✓
France				✓
Latin America				✓
Eastern Europe				✓
Francophone Africa				✓

(Adapted from Grimsey & Lewis, 2005)

It is evident from Table 4.1 that only Germany adopts complete cost-benefit analysis method in assessing VfM, and that method is the most complex followed by PSC prior to bidding process while reliance on competitive bidding only is the least complicated method (Grimsey & Lewis, 2005). Table 4.1 further reveals that many countries relied on competitive bidding only in assessing VfM in PPPs.

4.4 Risk in PPPs

The proper identification and allocation of risks is a key to the successful PPP project implementation. OECD (2008b) reports that achieving VfM in PPP project depends on the ability of the major participant to adequately identify, analyse, and allocate risks. This is corroborated by Thomas *et al*. (2006) that the success recorded in PPP projects, particularly BOT projects are due to proper risks identification, assessment, and allocation. Therefore, the sound risk management strategy involves the allocation of risks to the best parties that can manage it (Pryke & Ouwerkerk, 2003; OECD, 2008b). Corner (2006) states that to best manage risk means to manage it at least cost that is, in the long run, reduce the total cost of the project. Many PPP projects are susceptible to complex risks emanating from the complex nature of PPPs itself that involve various participants with diverse interests, market conditions among others (Grimsey & Lewis, 2002; Thomas *et al*., 2006; Gupta *et al*., 2013b). It is on this premise that Abednego & Ogunlana (2006) advocate for good project governance systems for proper risk allocation in PPP projects. Therefore, it is important for

PPP stakeholders, particularly the public and private sectors to understand different risks associated with PPP projects implementation.

4.4.1 **Identification and classification of risks in PPP projects**

It is increasingly evident that risk is inherent in all PPP projects as in any other infrastructure projects. Thus, some earlier researchers have identified and classified inherent risks associated with PPP projects. For instance, Ng & Loosemore (2007) assert that some risks affect PPP expected outcomes and classified the risks as general risks and project risks. Elbing & Devapriya (2004) classify PPP risks as either global (independent of a project) or project risks. Li *et al*. (2005a) employ a meta-classification approach based on three levels of risk factors; this includes macro, meso, and micro levels of risks. Ibrahim *et al.* (2006) identify 61 risk factors in PPPs and classified it into exogenous and endogenous risks. In this study, the classification of risks by Padiyar *et al*. (2008) is adopted because risks associated with PPP infrastructure projects are broadly classified as shown in Figure 4.2 as follows:

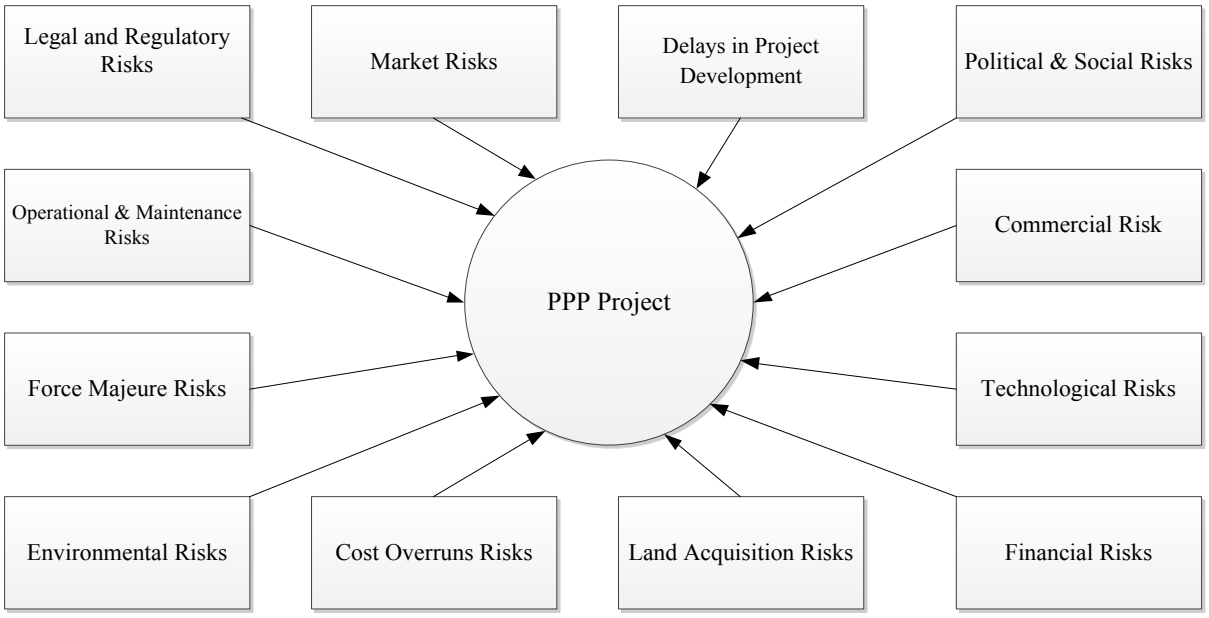


Figure 4.2: Risks associated with PPP infrastructure projects implementation (Adapted from Padiyar *et al.,* 2008, p.12)

It is evident from Figure 4.2 and also confirmed from existing literature that PPP projects are susceptible to some risks that demand utmost management by both the public and private actors to guarantee success in present and future PPP projects implementation. Therefore, successful PPPs are designed with careful attention to the context within which the partnerships will be implemented. Thus, it is important for all stakeholders in PPPs to have

in-depth understanding of PPPs environment with a view to responding actively to these risks.

4.4.2 **Risk matrix in PPPs**

UNESCAP (2007) recommends risk matrix as a best-practice methodology in risk management. Therefore, risk matrix indicates selected mitigation measures against identified category of risk in PPP project is presented in Table 4.2 as follows:

Table 4.2: Risk matrix in PPPs

Risk category	**Phase of predominance**	**Description and likely effect**	**Mitigation measures**
1. Land acquisition	Construction	Delays in construction as a result of a dispute that arise in the acquisition of lands and problem of access to the right-of-way.	(a) All land issues should be resolved before the concession award. (b) Provision of alternative routes before construction commences (c) The government should appropriately extend the concession period.
2.Sponsor risk	Construction/ Operation	Failure on the part of private party/ SPV to provide the required services as previously agreed (i.e. private party/ SPV is incapacitated).	(a) Due diligence on the private parties and their sponsors. (b) Performance bond .i.e. Private parties/sponsors commitments are supported by performance guarantees among others.
3. Financial risk	Construction/ Operation	Shortages of funds to progress or complete the project as a result of financing mechanisms (e.g. equity) required by private sponsors are no longer available.	(a) Public sector agency should strictly ensure that all bids are supported by strong financial commitments with minimal achievable conditionality. (b) Host government should provide subsidies in the form of guarantee to the private party on the interest rate, tariff, and provision of loans among others.
4. Demand/ revenue risk	Operation	This risk is associated with some factors. For instance, insufficient revenue due to low demand, leakages, competing facilities, high price setting among others.	(a) Comprehensive demand studies to provide realistic demand estimates. (b) The concession agreements should be flexible to accommodate the appropriate extension of the concession periods. (c) The government is buying out the facilities if designated returns are not achieved over a period of years.

Risk category	Phase of predominance	Description and likely effect	Mitigation measures
5. Time overrun risk	Construction	Non-completion of the project as it was agreed in the concession agreement.	(a) Public sector agency should thoroughly verify the technical competence and experience of contractor and subcontractors (b) Completion bond: Contractor and subcontractors should provide completion bond before the contract is awarded to them. (c) Penalty regimes i.e. liquidated and ascertain damages (LAD) should be paid by the contractors for the period the work is being delayed. (d) Review and monitoring of work by independent engineers.
6. Operating risk	Operation	This risk is associated with factors negatively impacting operation, thereby increased operation cost.	(a) The selection of operation and maintenance (O&M) operator should be competitive. (b) Technology provider should guarantee their products. (c) Maintenance bond: O&M operator should provide maintenance bond before selection. (d) Specification output should be cleared and comprehensive.
7. Force majeure	Throughout project cycle	This type of risk is called "Act of God". This includes earthquake, flood, and storm among others. The effects can be minor, major or severe. It may lead to a total closure of construction/operation if not understandably addressed.	(a) Provision of insurance cover. (b) Relief for short-term closedown. (c) Provision of compensation at the expiration of concession period.

The risk matrix as shown in Table 4.2 indicated few examples of how identified risks can be assessed, and mitigated in PPP projects. It is, therefore, necessary for the parties involved in PPPs, particularly the public sector, the private investors, and the financials/lenders to strictly undertake due diligence to achieving good balance in identifying, sharing, and mitigating risks. As risks are inevitable in PPP projects and any other infrastructure projects, PPP has advantages in addressing risks, which is a sharing/allocating risk to the party that is best equipped to manage the risks cost-effectively with overall aim of achieving VfM. Thus, this is the primary justification for using PPP for infrastructure projects.

4.5 Drivers for adopting PPPs for infrastructure development

Countries across the globe are increasingly aware of the need to adopt PPPs for the infrastructure development. Thus, drivers for the adoption have been studied by some researchers in mature and emerging economies, particularly in the UK, Australia, and China among others. Therefore, selected literature on drivers are identified in Table 4.3 as follows:

Table 4.3: Selected literature on drivers for adopting PPPs

Ref. code	Drivers	References
DR01	**Better risk allocation/sharing**: This is one of the primary objectives of PPP. Sharing/allocating risks to the party that can manage it efficiently.	Grimsey & Lewis, 2002; EU, 2003; Efficiency Unit, 2003; Flinders, 2005; Valila, 2005; Li *et al*., 2005b; PECC, 2006; Ernst & Young, 2007; OECD, 2008b; Kwak *et al*., 2009; KPMG, 2010; AfDB, 2010; PwC, 2010; TTC, 2010; ADBI, 2011; NCF, 2011; United Nations, 2011; UN-HABITAT, 2011; HM Treasury, 2012; IISD, 2012.
DR02	**Better value for money**: This is usually the principal justification for a PPP route.	HM Treasury, 2000; Spackman, 2002; EU, 2003; Harris, 2003; Hurst & Reeves, 2004; PwC, 2004; Hodge, 2004; Li *et al*., 2005b; Valila, 2005; HM Treasury, 2006; Hodge & Greve, 2007; OECD, 2008b; Kwak *et al*., 2009; AfDB, 2010; KPMG, 2010; PwC, 2010; World Bank, 2011a; Sanusi, 2012; IISD, 2012.
DR03	**Faster implementation**: Combine responsibility of the private sector in design and construction fast track the commencement of infrastructure projects and deliver within the timeframe.	EU, 2003; Harris, 2003; PwC, 2005; Deloitte, 2007; Ernst & Young, 2007; Pollock *et al*., 2007; AfDB, 2010; TTC, 2010; PwC 2010; ADBI, 2011, UN- HABITAT, 2011; IISD, 2012.
DR04	**Improved quality of service**: Improved quality of service: This resulting from the better integration of services with supporting assets among others.	Walker *et al*., 1995; HM Treasury, 2000; EU, 2003; Harris, 2003; PECC, 2006; Ernst & Young, 2007; PwC, 2010; ADBI, 2011, Akintoye & Liyanage, 2011; UN-HABITAT, 2011.
DR05	**Accelerate infrastructure provision**: PPPs facilitate projects to commence when the availability of public capital may be constrained.	Efficiency Unit, 2003; EU, 2003; Harris, 2003; PwC, 2004; PECC, 2006; Deloitte, 2007; Ernst & Young, 2007; AfDB, 2010; PwC, 2010; ADBI, 2011; Akintoye & Liyanage, 2011; HM Treasury, 2012; IISD, 2012.
DR06	**Better incentives to perform**: The adequate sharing of risks would enhance the private sector performance on any given project.	EU, 2003; AfDB, 2010; ADBI, 2011; NCF, 2011.
DR07	**Enhanced public management**: Delivering public facilities and services through PPPs enable government focusing on service planning and performance monitoring.	Walker *et al*., 1995; EU, 2003; Ernst & Young, 2007; Kwak *et al*., 2009; AfDB, 2010; ADBI, 2011, UN-HABITAT, 2011.
DR08	**Generate additional revenues**: The private sector enables to generate additional revenues from shared use of facilities.	EU, 2003; AfDB, 2010; ADBI, 2011; United Nations, 2011.
DR10	**Solve the problem of public sector budget constraints**: PPP mitigates the governments' inability to raise massive funds for large-scale	Walker *et al.*, 1995; Akintoye *et al*., 2001; PwC, 2004; IMF, 2006; PECC, 2006; Kwak *et al*., 2009; AfDB, 2010; TTC, 2010; NCF, 2011; UN-HABITAT, 2011; World Bank, 2011a; IISD, 2012.

Ref. code	Drivers	References
	infrastructure projects.	
DR11	**Invoking private sector skills, experience, access to technology, and innovation**: Public sector is not innovative as the private sector.	Efficiency Unit, 2003; Harris, 2003; Reeves, 2003; Jamali, 2004; PwC, 2005; Kwak *et al*., 2009; AfDB, 2010; KPMG, 2010; TTC, 2010; United Nations, 2011; World Bank, 2011a; IISD, 2012.
DR12	**Invoking discipline**: The private sector has more discipline for translating strategic intent into actions.	Efficiency Unit, 2003; AfDB, 2010.
DR13	**Improve buildability**: PPP facilitates construction in achieving desired results safely and at least cost.	Li, 2003; Chan *et al*., 2009.
DR14	**Improve maintainability**: PPP ensures optimum use of facility maintenance knowledge and experience in all phases of the facility delivery process.	Li, 2003; Chan *et al.,* 2009.

The effort at investigating drivers for the adoption of PPPs through empirical study has not received adequate attention in developing countries, especially in Nigeria. Therefore, this study is imperative to identify and critically assess the drivers for adopting PPPs in Nigeria. This will be of benefit to both the potential local and foreign private investors to be aware of primary drivers for adopting PPPs in Nigeria, thus helps them to develop strategies for penetrating Nigeria and other developing countries PPP market successfully. It is worth noting that Nigeria has a long list of real potentially viable infrastructure projects that can be optimised through PPPs.

4.6 Barriers for implementing PPPs

Despite the huge recognition of PPPs and their increasing usage in infrastructure development, the experience of both the public and private sector with PPP has not always been positive (Kwak *et al*., 2009). Some PPP projects are either held up or terminated. This is corroborated by Yuan *et al.* (2009) that PPPs have been widely applied in the global construction market but a number of factors affected its performance resulting in inefficiency and ineffectiveness of the projects. Jefferies *et al*. (2002) argue that some infrastructure partnerships between the public and private sectors in the past are yet to provide evidence of successful completion. For instance, Akintoye *et al*. (2003) identified lack of relevant experience, provision of incomprehensive up-front project information, slow negotiations, less open communication, inconsistent risk assessment and management among others as problems for achieving best value in PFI projects. Ogunlana (1997) identifies political instability, the inadequate experience of PPPs among others as barriers that caused the failure of two build-operate-transfer (BOT) projects in Thailand. Abdul-Aziz

(2001) identifies absence of competition, the inefficiencies and management blunders of concessionaires as barriers responsible for the failure of Malaysia's privatised national sewerage project.

In Nigeria, studies on barriers to PPPs especially those that are empirical remain rare. Therefore, it becomes imperative to identify and assess the barriers to PPP projects implementation in Nigeria. This will enable the governments and other stakeholders, particularly potential local and foreign private investors to recognise significant barriers in the implementation of PPP projects in Nigeria. The results of the study are expected to help them strategies for penetrating Nigeria and developing countries PPP market successfully. These study results are crucial as not many empirical studies have been conducted in Nigeria. Earlier researchers have directed their attentions to identify barriers to PPPs implementation. Therefore, selected literature on barriers to PPP projects are presented in Table 4.4 as follows:

Table 4.4: Selected literature on barriers to PPP projects

Ref. code	Barriers	References
BR01	Inadequate consultation with stakeholders to create greater acceptance of PPPs	Chen, 2007; UNECE, 2008; Ahmed, 2011; UNESCAP, 2011
BR02	Potential conflicts of interests among the stakeholders	Akintoye *et al*., 2003
BR03	Public sector inability to manage consultants	Akintoye *et al*., 2003
BR04	Cultural impediments include behaviours of people towards PPPs	Gunnigan & Rajput, 2010
BR05	Public opposition/Public resistance	El-Gohary *et al*., 2006; Abdel Aziz, 2007; Gibson & Davies, 2008; UNECE, 2008
BR06	Lack of confidence and mistrust in PPPs	UNDP, 2005; Mahalingam, 2010
BR07	Fear over the implications of decisions made	Harris, 2003
BR08	Societal discontent against the private sector	Klein & Roger, 1994; Gomez-Ibanez, Lorrain & Osius, 2004; Mahalingam, 2010
BR09	Low trust between public and private sector	UNDP, 2005; Chen, 2007
BR10	Lack of governmental assistance in resolving conflicts arising from toll charges	Chen, 2007
BR11	Public resentment due to tariff increases.	Harris, 2003; Akampurira *et al*., 2009; Mahalingam, 2010
BR12	Weak /poor enabling policies	Mahalingam, 2010; UNESCAP, 2011
BR13	Weak/poor regulatory frameworks and enforcement	Asian Business, 1996; Akampurira *et al*. 2009; UNESCAP, 2012
BR14	Problems of administrative procedures and guidelines	Gidado, 2010; Yang *et al*., 2010
BR15	Non availability of model concession agreements	Gidado; 2010; UNESCAP, 2012
BR16	Weak institutional capacity and PPPs strategy	Mahalingam, 2010
BR17	Weak judicial framework/weak judiciary for resolving PPP disputes	Li *et al*., 2005b; Zhang, 2005; Akampurira *et al*., 2009
BR18	Law and regulation changes	Gunnigan & Rajput, 2010; Yang *et al*., 2010
BR19	Low credibility of government policies.	Asian Business, 1996.
BR20	Lack of public sector project development funds to promote PPPs	UNESCAP, 2011.
BR21	Inability of local institutions to provide long-term financing/equity financing	ADB, 2000; Zhang, 2005; Akampurira *et al*., 2009
BR22	Difficulties in securing credit facility from banks	Gidado, 2010

Ref. code	Barriers	References
BR23	Problems of delays in receiving payments	Gidado, 2010
BR24	Perceptions of a country/nation as high-risk economy by foreign investors	Akampurira *et al*., 2009; Gidado, 2010
BR25	Difficulty in obtaining foreign exchange/foreign exchange risk	Gidado, 2010; Akampurira *et al*., 2009
BR26	Perceived rise in tariffs	Harris, 2003; Gomez-Ibanez *et al*., 2004; Akampurira *et al*., 2009
BR27	Macroeconomic fluctuations in currency or purchasing power	Gomez-Ibanez *et al*., 2004
BR28	Inadequate domestic capital markets	Asian Business, 1996
BR29	Land acquisition problems	Yang *et al*., 2010; UNESCAP, 2011
BR30	Lack of coordination between national and regional governments	Akampurira *et al*., 2009; UNESCAP, 2011
BR31	Lack of PPPs enabling environment	Leiringer, 2003; Akampurira *et al*., 2009
BR32	Lack of transparency and accountability	Asian Business, 1996
BR33	Lengthy delays in negotiation/ Delays due to lengthy bureaucratic procedures	Li *et al*., 2005b; Chan *et al*., 2006; Akampurira *et al*., 2009; Chan *et al*., 2010b;
BR34	Poor coordination between different public sector departments	Lamech & Kazim 2003; UNESCAP, 2011
BR35	Accusations of corruption and corrupt tendencies	Williams, 2006; Ibrahim *et al*., 2006; Akampurira *et al*., 2009; Gidado, 2010
BR36	Lack of independence of regulatory body	Akampurira *et al*., 2009
BR37	Lack of completion in procurement procedures	UNESCAP, 2012
BR38	Political reneging	Akampurira *et al*., 2009; Gidado, 2010
BR39	Poor understanding of PPPs by politician/decision makers	Zhang, 2005b; Gidado, 2010; UNESCAP, 2012
BR40	Distortions of guarantees/incentives by governments	ADB, 2000; Akampurira *et al*., 2009
BR41	Lengthy delays due to political debate	Akampurira *et al*., 2009; Chan *et al*., 2010b
BR42	Uncertainty of political environment/political instability	UNECE, 2008; Gidado, 2010
BR43	Politicization of the concessions/Political interference in procurement process	Sader, 2000; Gidado, 2010
BR44	Incapability of government to manage PPP projects	Kwak *et al*., 2009
BR45	Lack of strong political commitment for PPPs	UNECE, 2008; Akampurira *et al*., 2009; Gidado, 2010; UNESCAP, 2012
BR46	Complex decision-making	Asian Business, 1996; Zhang, 2005b
BR47	Lack of capacity in public sector to develop and manage PPP process	UNESCAP, 2011
BR48	PPP process not clearly defined/lack of clarity	Chen, 2007; UNESCAP, 2012
BR49	Lack of capacity of private sector to adequately meet the challenge of investing in a very large number of PPP projects	Gunnigan & Rajput, 2010; UNESCAP, 2011
BR50	Difficulty in specifying work requirements and the quality of service	Akintoye *et al*., 2003;
BR51	Lack of experience and expertise in both the public sector and private investors	Li *et al*., 2005b; Chan *et al*., 2006; Corbett & Smith, 2006; UNESCAP, 2012
BR52	Inconsistent risk assessment and management/Poor risk management	Akintoye *et al*., 2003.
BR53	Provision of incomprehensive up-front project information by public sector	Akintoye *et al*., 2003.
BR54	Shortage of professionals to handle PPP projects	Gunnigan & Rajput, 2010.
BR55	Unavailability of large construction companies to	Gunnigan & Rajput, 2010.

Ref. code	Barriers	References
	deliver PPP projects	
BR56	Lack of innovations in design	Corbett & Smith, 2006.
BR57	Lack of flexibility	Corbett & Smith, 2006.
BR58	Inefficiencies and management blunders of the concessionaire	Abdul-Aziz, 2001.

The identification of the barriers to PPP projects in this study will benefit the stakeholders involved in PPPs to build in strategies to cope with the barriers with a view to safeguarding the present and future PPP projects implementation. It will also assist PPP stakeholders in decision making and planning as well as helping them in building a successful risk management programs.

4.7 Critical success factors (CSFs) of PPPs

PPP is being considered and becoming the preferred method for delivering pubic infrastructure projects throughout the world (Gunnigan & Rajput, 2010). In view of increasing adoptions of PPP all over the world, a number of PPP projects in mature economies experienced successful implementation, particularly in the UK, Australia, Canada among others (Qiao *et al*., 2001; Jefferies *et al*., 2002; Li *et al*., 2005a). Therefore, this triggered a number of researchers toward identifying CSFs that are responsible for the successful implementation of PPP projects in different countries (Stonehouse *et al*., 1996; Tiong, 1996; Gupta & Narasimham, 1998; Qiao *et al*., 2001; Jefferies *et al*., 2002; Zhang, 2005b; Li *et al*., 2005c; Cheung *et al*., 2012a). The concept of CSFs was first used in information systems and project management by Rockart and the Sloan School of Management (Jefferies *et al*., 2002). Rockart (1982) defines CSFs as those limited areas where 'things must go right' for a particular business to survive. Kwak *et al*. (2009) describe CSFs as "few key areas in which satisfactory results are necessary to ensuring successful competitive performance for the organization". Rowlinson (1999) asserts that CSFs require day-to-day utmost attention throughout project life cycle. Ram & Corkindale (2014) argue that CSFs require the constant and careful attention of management with a view to achieving organisation performance goals. Zhang (2005b) asserts that the identification of CSFs has been regarded as the first significant step towards the development of a workable and efficient PPP protocol. The potential application and importance of CSFs are now being recognized in a growing number of organizations. Given this, some earlier researchers have directed their attentions in identifying CSFs for PPPs to help achieving successful

implementation. Thus, selected literature on success factors for PPP projects in different countries are presented as follows:

Table 4.5: Summary of selected literature on success factors for PPP projects

Ref. code	Success Factors	References
SF01	Transparency in the procurement process	Li *et al*., 2005c; Chan *et al*., 2010a; Cheung *et al*., 2012a; Gupta *et al*., 2013a
SF02	Competitive procurement process	Jefferies *et al*. 2002; Li *et al*., 2005c; Chan *et al*., 2010a; Cheung *et al*., 2012a; Gupta *et al*., 2013a
SF03	Good governance	Li *et al*. 2005c; Ismail & Ajija, 2011
SF04	Well organised and committed public agency	Gupta & Narasimham, 1998; Li *et al*., 2005c
SF05	Social support	Gupta & Narasimham,1998; Li *et al*., 2005c
SF06	Shared authority between public and private sectors	Stonehouse *et al.,* 1996; Kanter, 1999; Li *et al*., 2005c; Chan *et al*. 2010a
SF07	Thorough and realistic assessment of the cost and benefits	Li *et al*., 2005c
SF08	Favourable legal framework	Li *et al*., 2005c; Ismail & Ajija, 2011; Cheung *et al*., 2012a
SF09	Project technical feasibility	Qiao *et al*., 2001; Li *et al*., 2005c
SF10	Appropriate risk allocation and risk sharing	Grant, 1996; Qiao *et al*., 2001; Li *et al*., 2005c; Zhang, 2005b; Cheung *et al*., 2012a
SF11	Commitment and responsibility of public and private sectors	Stonehouse *et al.,* 1996; Kanter, 1999; Li *et al*., 2005c; Ismail & Ajija, 2011; Cheung *et al*. 2012a
SF12	Strong and good private consortium	Tiong, 1996; Jefferies *et al*., 2002; Zhang *et al*., 2002; Li *et al*.,2005c; Dulaimi *et al*., 2010; Cheung *et al*., 2012a
SF13	Government involvement in providing guarantees	Stonehouse *et al.,* 1996; Zhang *et al*., 1998; Kanter, 1999; Li *et al*., 2005c; Zhang, 2005b; Chan *et al*., 2010a; Cheung *et al*., 2012a
SF14	Multi – benefits objectives	Grant, 1996; Li *et al*., 2005c
SF15	Political support	Zhang *et al*., 1998; Qiao *et al*., 2001; Li *et al*., 2005c; Zhang, 2005,; Dulaimi *et al*., 2010; Chan *et al*., 2010a
SF16	Stable macroeconomic conditions	Qiao *et al*., 2001; Li *et al*., 2005c; Chan *et al*., 2010a; Cheung *et al*., 2012a
SF17	Sound economic policy	Li *et al*., 2005c; Ismail & Ajija, 2011
SF18	Availability of suitable and adequate financial market	Qiao *et al*., 2001; Li *et al*., 2005c; Chan *et al*., 2010a; Ismail & Ajija, 2011
SF19	Technical innovation and technology transfer	Tiong, 1996; Gupta & Narasimham, 1998; Qiao *et al*., 2001; Chan *et al*., 2010a; Cheung *et al*., 2012a
SF20	Effective management control	Qiao *et al*., 2001; Chan *et al*., 2010a; Cheung *et al*., 2012a
SF21	Consultation with end-users	Chan *et al*., 2010a; Cheung *et al*., 2012a
SF22	Appropriate project identification	Tiong, 1996; Qiao *et al*., 2001; Askar & Gab-Allah, 2002; Chan *et al*., 2010a; Cheung *et al*., 2012a
SF23	Clear project brief and client requirements	Chan *et al*., 2010a; Cheung *et al*., 2012a
SF24	Project economic viability	Zhang, 2005b; Chan *et al*., 2010a
SF25	Favourable investment environment	Zhang, 2005b
SF26	Good partners' relationship	Zhang, 2005b; Chan *et al*., 2010a; Cheung *et al*., 2012a

It is apparent from Table 4.5 that many studies have been conducted in identifying CSFs for PPP projects. Thus, most of these studies are conducted in both mature and emerging economies like UK, Australia, United States, China, and Hong Kong among others. Existing

studies on PPPs in Nigeria (see Adeniyi *et al.,* 2011; Aje & Adeniyi, 2012; Babatunde *et al*., 2012; Famakin *et al*., 2012) have focused on its strengths, weaknesses, opportunities, threats as well as on its performance indicators. Few of these studies that examined CSFs for PPP projects (e.g. Babatunde *et al*., 2012) failed to discuss the phenomenon from primary stakeholder perspectives. Considering this phenomenon from primary stakeholder perspective will provide a richer and more practical knowledge of CSFs for PPP projects in Nigeria. It is in pursuance of this that five different stakeholder organisations already involved in PPP infrastructure projects implementation to include public sector authorities, concessionaires, local lenders/banks, consultants, and contractors are considered as respondents in this study.

Therefore, this study is not only filled the knowledge gap by identifying specific CSFs through a multiple PPP case study approach, but it is also provided a list of CSFs that could be used to develop metrics and standard for measuring maturity levels of stakeholder organisations on CSFs in PPP projects implementation in Nigeria. This would help stakeholders in identifying areas for improvement in PPP project process. The findings emanating from this study prove to be more reliable as they come about not merely from a secondary data investigation but rather from field work approach that involved getting stakeholders share their true practical experiences. Thus, this study is expected to enhance the success rate of PPP projects in Nigeria.

4.8 Chapter summary

This chapter provided insight on PPP projects implementation. The review findings indicated that value for money and better risk sharing are principal justifications for adopting PPP for infrastructure projects. An extensive review was conducted on value for money (VfM). The finding revealed that PSC is a preferred assessment tool in many countries to assess VfM. The review on risks in PPPs revealed that risks are inherent in PPP projects, and success recorded in PPP projects are due to proper risks identification, assessment, and allocation. A comprehensive review was further conducted on drivers for adopting PPPs, barriers to PPP projects, and success factors for PPP projects. The review findings identified 14 drivers for adopting PPPs, 58 barriers to PPP projects, and 26 success factors for PPP projects. These identified factors are properly coded for easy identification and cross-referencing purposes in the next chapters.

Chapter 5: RESEARCH METHODOLOGY

5.1 Introduction

This chapter presents the approach adopted for this research together with relevant justifications for the approach and methods. The purpose of this chapter is to create an appropriate methodology for this study, which helps in achieving the objectives of the study. The success of any research work is hinged to a large extent on the methodology adopted by the researcher in gathering and analysing of the data. Therefore, this chapter focuses on research methodology and methods. The research methodology encompassed the research philosophies, research approaches, research strategies, methodological choices among others. On the other hand, the research methods comprised sampling techniques and procedures, data collection techniques, data analysis techniques among others. All these are discussed and justified in this chapter.

5.2 Research design/stages

Research design is being described as a research process encompassed plans, procedures, broad data collection methods, and analysis (Creswell, 2009). The author asserts that research design is very challenging due to lack of consensus among the researchers in respect of appropriate direction of the research process. This is corroborated by Rudestam & Newton (2007) that describe research design as 'being lost in the wildernesses'. Love *et al.* (2002) assert that a lot of argument had been generated by suitable research methodology to be employed in construction management research. Mingers (2001) argues that research design is a process that has phases and predominates at different times. The author claimed that research methods are of different approaches, but advocated for a combination of approaches with a view to providing a more robust research outcome. This is affirmed by Love *et al.* (2002) that encourage researchers in construction management to consider triangulation as a research methodology. Based on the foregoing, Crotty (1998) identifies four research stages as epistemology, theoretical perspective, methodology, and methods (see Figure 5.1 for details).

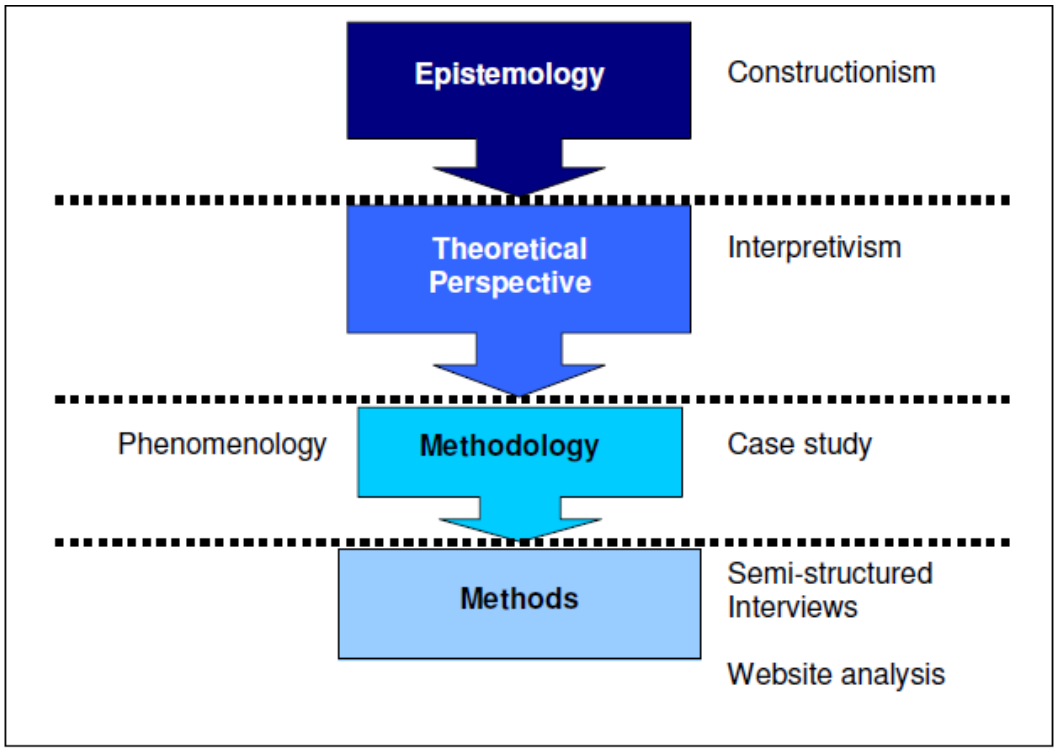


Figure 5.1: Research stages (Adapted from Crotty, 1998, p. 4)

Saunders *et al*. (2012) classify research process into six phases. This includes: research philosophies; research approaches; research strategies; methodological choices; time horizons; and techniques and procedures (data collection and analysis). The model that presented the stages is termed as 'the research onion' and it is illustrated in Figure 5.2 as follows:

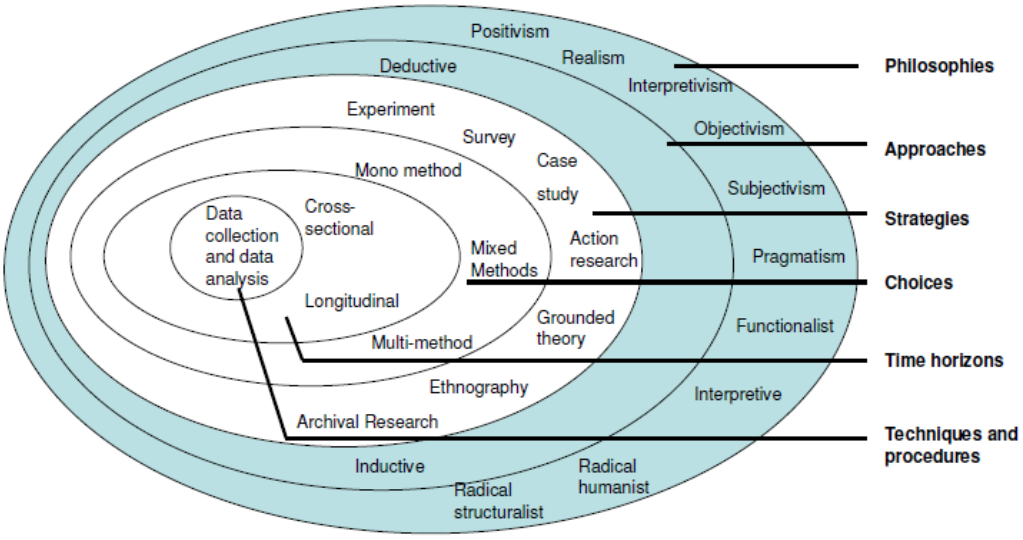


Figure 5.2: Research process 'Onion' (Adapted from Saunders *et al*., 2012, p.128)

Saunders *et al*. (2012) research process 'onion' classification is comprehensive, and more helpful in achieving these study objectives. Therefore, this study adopted Saunders *et al*. (2012) research process 'onion' classification. Given this, the six research process phases are discussed as follows:

5.2.1 **Research philosophies**

There are some research philosophies available to the researchers as shown in the research process onion (see Figure 5.2). Earlier researchers have emphasised philosophical underpinnings in the research process. For instance, Dainty (2007) gives particular importance to a philosophical background in the research process. McCallin (2003) asserts that philosophical position should be reviewed and considered in the direction of inquiry. Flick (2006) argues that methodology of any study relies upon the philosophy underpinning the research. It is against this backdrop that this study is structured in a philosophical position of epistemological and ontological concepts. The concept of epistemology specifies the nature of human knowledge and understanding that can be acquired through different types of inquiry and alternative methods of investigation (Guba & Lincoln, 1994). On the other hand, ontology concept specifies the form and nature of reality and what can be known about it.

The philosophical concepts underlying this study emanate from positivism. This study also has the footprint of post-positivism. This is corroborated by Guba & Lincoln (1994) that post-positivism is one of the additions and extensions of positivism paradigm. This study, therefore, employed the positivism paradigm where the knowledge of PPP infrastructure projects is substantiated through cumulative of established facts and analysed in a manner that facilitates replication. The philosophical assumption underlying the choice of what (or how) in this study is addressed by the epistemological stand. For example:

- *How can critical success factors that are peculiar to the successful realisation and delivering of PPP infrastructure projects be identified?*
- *How can capability maturity levels for stakeholder organisation in PPP infrastructure project be determined?*

In the same vein, Finlay (2006) asserts that ontology is the metaphysical examination of the nature of being: existence; or reality. Therefore, studies on PPP projects are objective realities. Thus, the ontological concept is employed in addressing the other part of the research question. For instance:

- *What are the drivers and barriers to PPPs infrastructure projects*?

Moreover, positivism and post-positivism paradigms are employed in this study. For instance, positivism is employed because it is a scientific framework that aims to generate empirical evidence that is objective and testable (Finlay, 2006). Further, Flick (2006) asserts that positivism seeks for an objective 'truth', which is seen to exist independently of the individual's perceptions of it. Saunders *et al. (*2012) assert that positivism is associated with quantitative research. Gill & Johnson (2010) describe positivism as collecting data about observable reality. Also, the philosophical underpinning the case study approach in this study is post-positivism. This is supported by Yin (2012), Flyvbjerg (2011), and Eisenhardt (1989) that viewed the case study approach from post-positivism perspective. This study, therefore, employed questionnaire survey (quantitative research strand), case study and expert forum (qualitative research stand) to extract facts from the subjective understanding of participants involved in PPPs infrastructure projects in Nigeria. The combination of positivism and post-positivism enhanced the study objectives to be investigated in a deeper and wider perspective.

5.2.2 **Research approaches**

There are two research approaches (see Figure 5.2) that are available to researcher: deductive; and inductive. The difference between inductive and deductive approach had been examined by earlier researchers. For instance, Maxwell (1998) and Corbetta (2003) state that the major issues differentiating between inductive and deductive approaches are the nature of data. Creswell (2007) describes research approach as a useful strategy to increase the validity in social research. Therefore, this study employed both deductive (questionnaire survey) and inductive approach (case studies, and expert forum) for a richer approach to obtaining and analyse data from multiple sources. The richness of data are become necessary to identify and assess the drivers and barriers; and success factors for PPP infrastructure projects; and determine the critical success factors which is reflected in developing stakeholder organisations capability enhancement framework (SOCEF) in PPP projects.

5.2.3 **Research strategies**

The appropriate selection of research strategy is guided by the nature of the study. Thus, the research strategies employed for this study includes: questionnaire survey; case study and expert forum to achieve research aim and objectives. The questionnaire survey is designed in

relating to this study objectives. The case study is employed because it allows an inquiry into real life context of a research study. This study, therefore, considered multiple case studies of PPPs infrastructure projects in Nigeria because using single case study is not appropriate to generalise the results to a population. This supported by Yin (2009) that results emanated from a multiple case study are robust. Moreover, case study interviews are further employed within the case studies. Based on the foregoing, the research strategy used in this study is sequential exploratory design that consist more than one stage of data collection and analysis (Creswell & Clark, 2011; Saunders *et al*., 2012). The sequence of data collection is illustrated in Figure 5.3 as follows:

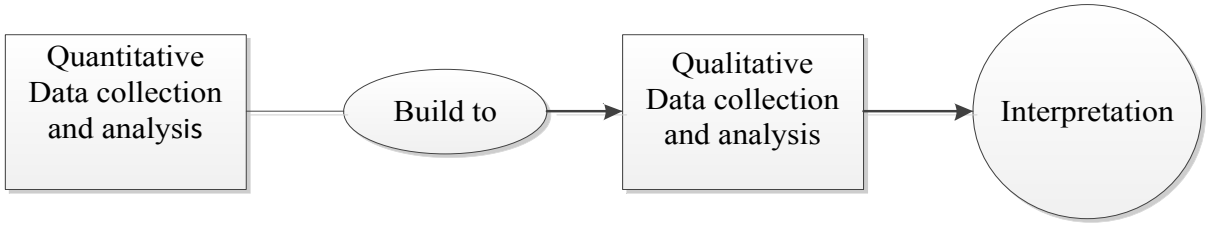


Figure 5.3: The sequential exploratory design (Adapted from Creswell & Clark, 2011, p. 69).

As shown in Figure 5.3, this study starts collecting and analysing quantitative data through questionnaire survey in which the identified drivers for adopting PPPs, identified barriers to PPP projects implementation, and identified success factors for PPP projects gathered through literature review are assessed in Nigeria context. Subsequently, the assessed success factors are building into six PPP project case studies to determine the critical success factors (CSFs) that responsible for successful implementation of PPP project in Nigeria; and then case studies interviews and expert forum are conducted to refine the framework developed using CSFs to define capability levels definition for stakeholder organisations involved in PPP projects and to determine the stakeholder organisations current maturity levels.

5.2.4 **Methodological choices**

The methodological choice adopted for this research is mixed methods because the research study combined both quantitative and qualitative research strategy. This includes: questionnaire survey; case studies; and expert forum to develop a richer theoretical perspective. Saunder *et al*. (2012) claim that using more than one data collection techniques, and analytical procedures are regarded as mixed methods. Bryman (2006) support the mixed methods because it enables researchers to have robust approaches to data collection, analysis, and interpretation. Robson (1993) opines that result findings from a single methodological choice may not robust when compared with mixed methods. It is against this

backdrop that a number of earlier researchers are advocating for two or more sources for data collection, analysis, and interpretation within a study (Todd, 1979; Denzin, 1989; Robson, 1993; Blackwood *et al*., 1997; Love *et al*., 2002; Yin, 2009). Thus, selected reasons for applying mixed methods design in this study are itemised in Table 5.1 as follows:

Table 5.1: Reasons for applying mixed method

Reasons	Description
Triangulation	Applying both quantitative and qualitative methods within a study to triangulate findings so that they may be mutually corroborated.
Credibility	Suggestions that are employing both approaches increase the findings credibility.
Different research questions	Refers to the argument that quantitative and qualitative can each answer different research questions.
Offset	It helps to offset weaknesses of both methods and allows the research to draw on the strength of both.
Instrument development	Refers to contexts in which qualitative research is employed to develop a questionnaire and scale items so that better wording or more comprehensive closed answers can be generated.
Utility or improving the usefulness of findings	Mixing the two approaches will be more useful to practitioners and others.
Enhancement or building upon quantitative and qualitative findings	Entails making more of or augmenting either quantitative or qualitative findings by gathering data using a qualitative or quantitative research approach.

(Adapted from Creswell & Clark, 2011)

Table 5.1 justifies the multiple reasons for applying mixed methods paradigm in this study that encompassed quantitative research strand (questionnaire survey) and qualitative research strand (case studies and expert forum). Thus, the quantitative and qualitative data collections are conducted sequentially (see Figure 5.3 for details).

5.2.5 **Time horizons**

Saunders *et al.* (2012) emphasise the importance of time horizon when planning a research study. Therefore, the time horizon for this study is cross-sectional because the doctoral studies have a time frame. Saunders *et al*. (2012) describe cross-sectional as a snapshot taken on a particular event in a given time. Thus, a cross-sectional research design is adopted to provide a 'snapshot' on the PPP infrastructure projects in Nigeria.

5.2.6 **Techniques and Procedures**

Saunders *et al*. (2012) assert that techniques and procedures involved the collection of data and analysis of the data obtained. There are two major approaches to gathering information in research. This includes primary and secondary data. This study employed both primary and secondary data collection methods. For example, the primary sources of data collection are through quantitative and qualitative strands that comprised questionnaire survey, and case studies (including direct and participant observations, and interviews). The secondary sources of data collection are through archival records, textbooks, journal articles, conference proceedings, government publications, institutional and professional bodies' publications, internet materials among others.

5.3 Sampling techniques

Kumar (2011) categorises the sampling techniques in quantitative research into three main types. These include: (i) random/probability sampling; (ii) non-random/non-probability sampling; and (iii) mixed sampling. Thus, each category has their sub-divisions, where each division has its specific steps for arriving at the desired selection. The different types of sampling techniques in quantitative research are illustrated in Figure 5.4 as follows:

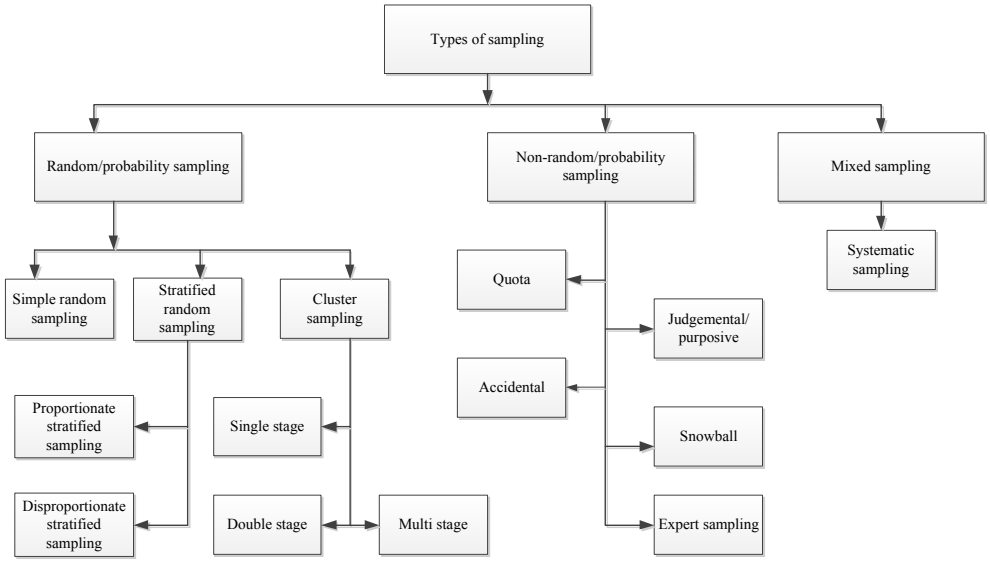


Figure 5.4: Types of sampling in quantitative research (Adapted from Kumar, 2011, p.198)

Figure 5.4 indicates the sampling techniques available to researchers in quantitative research. Therefore, in order to ensure a homogenous sample, using random or probability sampling technique is not feasible in this study. Because probability sampling requires that the respondents' population is known and adequately distributed (Diekhoff, 1992, Fellows &

Liu, 1997). It is against this backdrop that Li *et al*. (2005b) assert that none of these criteria are possible in present PPP/PFI studies. Given this, Li *et al*. (2005b) advocate for non-probability sampling in PPP research. It is on this premise that this study adopted non-probability sampling technique precisely 'purposive sampling' technique for the selection of only primary stakeholders (target population) comprising public sector authorities (i.e. ministries, department, and agencies); concessionaires; local lenders/banks; consultants; and contractors' organisations who already involved in PPP infrastructure projects from both public and private sectors in the study area (see Table 5.2 and Section 5.4.3 for details). This is supported by some earlier researchers. For instance, Badu *et al*. (2012) assert that purposive sampling technique enables the researcher to select the study participants consciously. Blaxter *et al*. (2006) argue that non-probability sampling is adjudging appropriate when the researcher lacks a sampling frame of the target population for the study. Marshall (1996) asserts that purposeful sampling technique enables the researcher to select actively the most productive sample to answer the research question(s). Having discussed the sampling techniques, it becomes necessary to discuss quantitative and qualitative research strands which are sequentially conducted in this study (see Figure 5.3).

5.4 Quantitative research strand

Teddlie & Tashakkori (1998) define strand as a "component of a study that encompasses the basic process of conducting quantitative or qualitative research: posing a question; collecting data; analysing data; and interpreting results based on the data collected". Thus, before discussing the three components, i.e. the process of data collection; data analysis; and interpretation in quantitative research, it becomes imperative to consider the study population, sample frame, and sample size.

5.4.1 Study population

This study is based on eliciting information from stakeholders involved in the execution of PPP infrastructure projects from conception stage to operation stage. Therefore, the target population for this study are primary stakeholders involved in PPP infrastructure projects in Lagos metropolis, South-western Nigeria. The rationale for choosing Lagos metropolis as a study area includes: accessibility to conduct the survey to obtain required data; availability of substantive PPP experts; and appropriateness of the PPP infrastructure projects for the analysis. The target population includes public sector authorities (i.e. ministries, department,

and agencies); concessionaires; local lenders/banks; consultants; and contractors' organisations involved in PPP infrastructure projects in the study area.

5.4.2 **Sample frame**

There is neither official list nor standard database stipulating the number of stakeholders involved in PPP infrastructure projects in Nigeria, probably because the PPPs procurement system is still at a formative stage. This is corroborated by Li *et al*. (2005b) that when PPP/PFI is evolving, the organisations involved are increasing; thereby the population cannot be readily determined. It is on this premise that the researcher contacted the Lagos State Public Private Partnerships Office and Lagos State Development and Property Corporation (LSDPC) to identify the primary stakeholders (target population) through "Project-Based Method". Based on this, 17 PPP infrastructure projects, in which the names and addresses of primary stakeholder organisations involved in that 17 PPP projects were identified. In the light of this, a total list of 173 primary stakeholder organisations was generated as the target population for this study. The breakdown of the target population is presented in Table 5.2 as follows:

Table 5.2: Breakdown of 173 target population achieved through project based method

S/n	Stakeholders	Population
1	Public sector authorities (ministries, department, and agencies)	31
2	Concessionaires	28
3	Local lenders/banks	22
4	Consultants	51
5	Contractors	41
	Total	**173**

Table 5.2 indicates the target population comprised 31 public sector authorities; 28 concessionaires; 22 local lenders/banks; 51 consultants; and 41 contractors that involved in identified 17 PPP infrastructure projects within the study area. The identified PPP infrastructure projects include: airport; seaports; roads; rails; power and energy; markets complex development; university hostel development; affordable housing; commercial offices among others.

5.4.3 **Sample size**

The sample size for this study is entire identified population as stated in Table 5.2, which is a total of 173 primary stakeholder organisations involved in PPP infrastructure projects in

the study area. This is supported by Fellows & Liu (2008) that if the population is sufficiently small, a full population sample may be considered. In view of this, the entire population of identified public sector authorities (ministries, department, and agencies); consultants; concessionaires; local lenders/ banks; and contractors involved in PPP infrastructure projects in the study area are sampled.

5.5 Data collection under quantitative research strand

In order to collect data under quantitative research strand, this study employed pilot study and questionnaire survey as a primary source of data collection. The secondary sources of data collection are through a literature review of different authors and researchers; archival materials among others. In quantitative research, the questionnaire survey is identified as an effective method to seek a large sample size for quantitative data analysis (Cheung, 2009). Further, Blaxter *et al.* (2001) argue that questionnaire survey is one of the most widely used social research techniques. Moreover, questionnaire survey was widely employed by a number of reputable earlier researchers in PPP studies (see Li *et al*., 2005b; Zhang 2005; Chan *et al*., 2010a; Cheung *et al.,* 2012a). It is against this backdrop that questionnaire survey was adopted in this study. Using questionnaire survey, the following objectives are achieved: "identify and evaluate the drivers and barriers of PPP infrastructure project implementation"; and "evaluate success factors applicable for PPPs infrastructure projects". Prior to data collection, a pilot study was conducted.

5.6 Pilot study

In this study, a pilot study was conducted to achieve the followings: (i) testing the applicability of 14 identified drivers for adopting PPPs; 58 identified barriers to PPPs implementation; and 26 identified factors contributing to success of PPP projects gathered through an extensive literature review (see Chapter 4 for details); and probably identifying additional new drivers; barriers; and success factors in Nigeria context; (ii) testing survey (questionnaire) interpretation; and (iii) identifying research population and PPP infrastructure project case studies. Using pilot study in construction management research is supported by some earlier researchers (see Chan & Kumaraswamy, 1997; Amaratunga & Baldry, 2001; Fellows & Liu, 2008) among others. Saunders *et al*. (2012) assert that before administering the questionnaire on a large scale, it is necessary to be pilot tested. This is corroborated by Fellows & Liu (2008) that questionnaires should initially be piloted, i.e. completed by a small sample of respondents. Thus, a face-to-face pilot study was carried out

on six participants that are purposively selected, based on their organisations involvement in PPP infrastructure projects in Nigeria. The selected six participants comprised senior managers and chief executives in both the public and private sectors. The six pilot study respondents completed the pilot questionnaire and gave their feedback. The outcomes of the pilot study produced 3 additional drivers; and 3 additional barriers, thereby resulting into 17 identified drivers for adopting PPPs; and 61 identified barriers to PPPs implementation that used to design the final questionnaire (see questionnaire copy in Appendix A for details).

5.7 Validity

Validity is the soundness and the effectiveness of the measuring instrument. This refers to the functionality of the instrument and accuracy of the reading by the instrument (Leedy & Ormrod, 2005). There are many ways in which the validity of a measurement can be tested to establish the quality of empirical social research (Yin, 2009). These include content validity; face validity; construct validity; external validity among others. In this study, the procedures undertaken to validate the questionnaire for pilot study are presented in Figure 5.5 as follows:

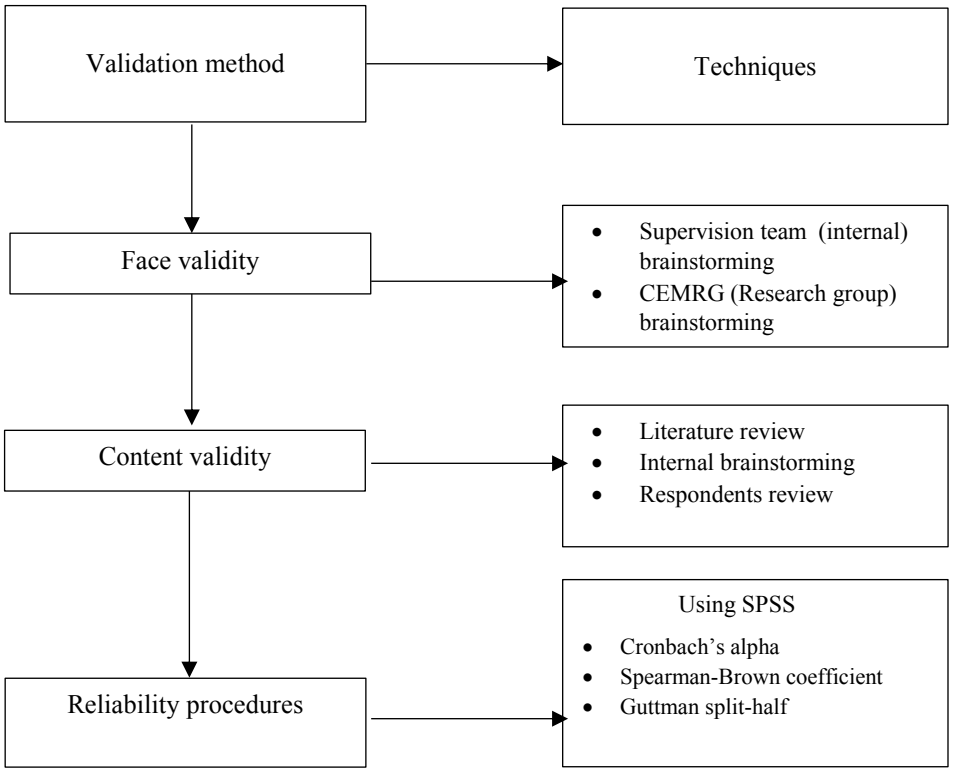


Figure 5.5: Procedures undertaken to validate the questionnaire for pilot study

The validity procedures applied in the pilot study are face validity and content validity as shown in Figure 5.5; the ways of achieving it are briefly discussed as follows:

5.7.1 **Face validity**

Parsian & Dunning (2009) assert that face validity is achieved when the questionnaire is proper in the circumstances of the study purpose and content area. The authors contend that face validity is very weak compared to others validity. Haladyna (1999), Trochim (2000), and DeVon (2007) argue that face validity assesses readability, consistency, formatting, and the clarity of the questionnaire. In this study, face validity was achieved through supervision team and Construction Economics and Management Research Group (CEMRG) brainstorming (see Figure 5.5).

5.7.2 **Content validity**

Fayers & Hand (2002) describe content validity as the extent to which items of a scale completely measure the relevant concepts without additional features. Content validity indicates that the content of the questionnaire is appropriate for the study. In view to ensuring content validity in this study, a comprehensive literature review was conducted and derived the dimensions from measuring the relevant constructs and variables from past studies. After that, a pilot questionnaire was designed and administered to six experts. The outcome of pilot testing was used to refine the questionnaire (see Figure 5.5). These efforts are aimed at achieving a level of understanding for survey items and establishing a logical link between items and the objectives of the study. Thus, the content validity of the scales was ensured (Kumar, 2005).

5.8 Reliability test

Reliability refers to the degree of consistency of results and the extent to which the measurements are free of random and unstable error (Cooper & Schindler, 2006). Garson (2009) asserts that reliability is the correlation of an item; scale; or instrument. The author argues that reliability can be estimated in one of four ways: (i) internal consistency; (ii) split-half; (iii) test-retest; and (iv) inter-rater. Decoster (2005) claims that Cronbach's alpha and the split-half methods are the most useful estimates of reliability. Garson (2009) argues that more than one reliability coefficient may be used in a single research setting. It is on this premise that this study applied both Cronbach's alpha and the split-half methods- particularly Spearman-Brown coefficient and Guttman split-half coefficient (see Figure 5.5). Therefore, using Statistical Package for the Social Sciences (SPSS) for the split half, four coefficients are generated. This includes: Cronbach's alpha; Spearman-Brown coefficient; Guttman split-

half coefficient; and Pearsonian correlation. These coefficients are briefly explained as follows:

5.8.1 **Cronbach's alpha test**

Cronbach's alpha test is one of the most popular reliability statistics in use (Cronbach, 1951). This is affirmed by Kothari (2009) that one of the most commonly used and recognised reliability coefficients is Cronbach's alpha. Alpha is based on the internal consistency of a test and interpreted as a correlation coefficient; it ranges in value from 0-1. Therefore, the questionnaire for this study was subjected to Cronbach's alpha test using SPSS. The reliability of the 5-point Likert scale used in the questionnaire was also examined by Cronbach's alpha test. Nunnaly (1978) argues that Cronbach's alpha value of 0.7 or higher is considered to indicate adequate reliability. This is supported by George & Mallery (2003) that Cronbach's alpha value of greater than 0.6 is considered acceptable. This is affirmed by Pallant (2007) that the value for Cronbach's alpha should be higher than 0.7 for the scale to be reliable.

5.8.2 **Split-half coefficient**

This technique encompassed Spearman-Brown and Guttman split-half coefficients. This technique is designed to correlate half of the items with another half. Kumar (2011) asserts that the technique is appropriate for instruments that are designed to measure attitudes towards an issue or phenomenon. The scores obtained by administering the two halves using SPSS in this study are correlated. The correlation coefficient ranges in value from 0 to 1, where 0.8 or higher is adjudged good reliability. Garson (2009) asserts that a cut-off value of 0.60 is adequate for exploratory research. The results of reliability tests conducted in this study are presented in Table 5.3 on the next page.

Table 5.3: Summary of reliability coefficients for the measuring scales using SPSS

	Measure scale	Cronbach's alpha	Spearman-Brown's split half coefficient	Guttman's split half coefficient	Internal consistency[1]
1	Drivers for adopting PPP for infrastructure projects	0.841	0.926	0.900	Good
2	Barriers to PPP infrastructure project implementations	0.948	0.968	0.967	Excellent
3	Success factors for PPP infrastructure projects	0.946	0.947	0.944	Excellent

Table 5.3 indicates the results of the reliability test conducted on each measure scale using SPSS. The results reveal the values of Cronbach's alpha, Spearman-Brown's split-half coefficient, and Guttman's split-half coefficient. The reliability test of the total scale indicates evidence of internal consistency and reliability of scales employed in the questionnaire for the study. Thus, the results in Table 5.3 confirmed that the instrument used in this study was significantly valid and reliable.

5.9 Design of the questionnaire

In designing a questionnaire, the researcher should be mindful of clarity of the questions and ensured that it is easy to comprehend without any interference by the researcher. This is corroborated by Kumar (2011) that the questionnaire layout should be interactive in such a way that respondents should perceive as if the researcher is talking to them. Saunders *et al.* (2012) argue that research question(s), objectives, and time available to complete the data collection among others are influenced the design of the questionnaire. Fellows & Liu (2008) claim that there are two forms in which the questions can be presented: (i) open-ended; and (ii) closed-ended. The authors assert that open-ended questionnaire allows the respondents to express his/her opinion freely. On the other hand, a closed-ended questionnaire is structured in a manner that there are instructions and introduction. It is then followed by questions asked and choice of options on the questionnaire.

[1] Excellent ($\alpha \geq 0.9$); Good ($0.7 \leq \alpha < 0.9$); Acceptable ($0.6 \leq \alpha < 0.7$); Poor ($0.5 \leq \alpha < 0.6$); Unacceptable ($\alpha < 0.5$)

Based on the foregoing, the questionnaires designed for this study is structured and multiple-choice type (see questionnaire copy in Appendix A for details). It is apparent that the most important feature of any questionnaire is the way and manner the questions are designed. In this study, the questions are developed through a comprehensive review of the literature with careful consideration of the nature of data to be collected. The questionnaire is structured into two main sections. The first part is termed "section A" contained the respondents' demographic/background information. These include: designation of respondents; academic qualifications; years of industrial experience; the number of PPP projects and types of PPP projects that the respondent organisations have undertaken. The second part that is "section B" was designed in addressing the study specific objectives. "Section B" was designed so as to obtain in-depth information on the drivers for adopting PPPs, barriers to PPPs implementation, and factors contributing to the success of PPP projects. The questions are asked on a 5-point Likert scale rating with 5 being the highest of the rating. Using the Likert scale in construction management research is increasingly popular due to its inherent advantages of being easy to construct and manage (see questionnaire copy in Appendix A).

5.10 Administration of the questionnaire

Saunders *et al*. (2012) assert that the questionnaire differs according to how it is delivered, returned or collected, and the amount of contact that the researchers have with the respondents. Kumar (2011), Saunders *et al*. (2012) argue that questionnaire can be administered in different forms. For example (i) Postal or mail questionnaires: posted to respondents who return them by post after completion. Kumar (2011) asserts that the main limitation of this method is the low response. (ii) The internet/intranet-mediated questionnaires or Web-based questionnaires: the questionnaires are sent electronically using internet/intranet. (iii) Delivery and collection questionnaires: the questionnaires are administered by hand to each respondent and collected later. In this study, delivery and collection questionnaires method was adopted. In which the questionnaires are distributed by face-to-face, and follow-up through telephone contacts and text messages is carried-out to remind the respondents to complete the questionnaires due to their tight schedule. This method provides added advantages. For example, it enables the researchers to ask questions and clarify issues. Also, respondents are motivated to provide honest and objective answers. Given this, there is the possibility of high response.

5.11 Tools for data analysis under quantitative research strand

The data obtained through questionnaires were analysed using the Statistical Package for Social Science (SPSS). Schutt (2006) proposes descriptive and inferential statistics for analysing numerical data. Therefore, this study employed both descriptive and inferential statistics for the analysis. The descriptive statistics techniques used includes percentage, average and mean score. The inferential statistics employed were Kruskal-Wallis test, and factor analysis. These are discussed as follows:

5.11.1 **Percentage**

This tool was employed in analysing data and presenting part of respondents profile results of the study because it is very easy to comprehend. The percentage was used to display some demographic information of respondents including designation, academic qualifications, and the number and types of PPP infrastructure projects that the respondents' organisations have undertaken among others.

5.11.2 **Average**

This tool was also employed in analysing data and presenting part of respondents profile results; this includes years of industrial experience among others. This technique was applied to ascertain the actual years of respondents industrial experience.

5.11.3 **Mean score**

The Likert scale and mean score was widely used by a number of researchers in construction management and PPP studies (see Chan & Kumaraswamy, 1996; Li, 2003; Li *et al*., 2005b; Li *et al*., 2005c; Ibrahim *et al*., 2006; Chan *et al*., 2010a; Cheung *et al.*, 2012b) among others. Cheung *et al*. (2012b) compute mean score (MS) by the formula as follow:

$$MS = \frac{\sum (f \times s)}{N}, \quad (1 \leq MS \leq 5) \quad \ldots\ldots\ldots\

Kruskal-Wallis test is very similar to that of the Mann-Whitney test. Field & Miles (2012), and Field (2013) state that Kruskal-Wallis test and Mann-Whitney test are based on ranked data. Fellows & Liu (2008) point-out that Mann-Whitney test is used when there are two samples. While Kruskal-Wallis test is employed when there are three or more samples. This is corroborated by Zikmund (2003) that Kruskal-Wallis test is an appropriate statistical technique when a researcher wishes to compare three or more groups or population, and the data are ordinal. It is against this backdrop that Kruskal-Wallis test was undertaken in this study to determine whether there are significant differences of opinions among public sector authorities, concessionaires, local lenders/banks, consultants, and contractors on the drivers for adopting PPPs, barriers to PPPs implementation, and factors contributing to success of PPP projects. Zikmund (2003) states that Kruskal-Wallis test requires the data to be ranked from lowest to highest or the original data are converted, so that a numerical rank may be assigned to every observation. This is affirmed by Field (2013) that Kruskal-Wallis test is based on ranked data and begins the scores from lowest to highest. The Kruskal-Wallis test statistic is the *H*-statistic (Zikmund 2003; Field & Miles, 2012; Field, 2013), and calculated with the formula as follows:

$$H = \frac{12}{n(n+1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j} - 3(n+1) \quad \text{..... (2)}$$

Where

R_j =sum of the ranks for each group
n = total sample size (in this case 113)
n_j = sample size of a particular group (in this case, there are 5 groups: 20; 25; 22; 23; and 23).

5.11.5 **Factor analysis**

DeCoster (1998) defines factor analysis as a collection of methods used to examine how underlying constructs influence responses to the variables measured. The author explained that there are two types of factor analysis: (i) exploratory; and (ii) confirmatory. Exploratory factor analysis (EFA) attempts to establish the nature of the constructs influencing a set of responses, while confirmatory factor analysis (CFA) tests whether a specified set of constructs is influencing responses in a predicted way (DeCoster, 1998). The principal component analysis (PCA) for factor extraction was employed in this study using SPSS. Field (2005) claims that PCA is concerned only with establishing which linear components

exist within the data and how a particular variable might contribute to that component. Therefore, PCA was conducted on the survey data to explore the grouping that might exist among the 17 identified drivers for adopting PPPs, 61 identified barriers to PPPs implementation, and 26 identified success factors that made PPP infrastructure projects successful.

5.12 Qualitative research strand

As previously mentioned, this study employed the case study research design and expert forum under qualitative research strand. Thus, expert forum was conducted as the main qualitative component in this study. Thomas (2011) argues that case study design is becoming increasingly popular among qualitative researchers. For instance, a number of notable earlier researchers have significantly contributed to the case study methodological developments across many disciplines (see Eisenhardt, 1989; Ragin & Becker, 1992; Stake, 1995; Yin, 2009; Denzin & Lincoln, 2011; Creswell, 2013). In this study, the philosophical approach to case study design is based on post-positivism. This is supported by Eisenhardt (1989), Flyvbjerg (2011), and Yin (2012) that viewed the case study approach from a post-positivism viewpoint. Yin (2012) describes post-positivism as a more pragmatic approach to case design by developing a case study protocol (CSP) that considers the elements in the case are appropriately described to eliminate bias and enhance validity.

5.12.1 **Case study research strategy**

This study adopted a case study design mainly to address the followings study research questions:

> *1. How can critical success factors that are peculiar to the successful realization and delivering of PPP infrastructure projects be identified?*
> *2. How can capability maturity level for stakeholder organisation in PPP infrastructure project be determined?*

This is corroborated by Barkley (2004) that a case study design is suitable for addressing *"how*" and *"why*" research question (s) within a study. Amaratunga & Baldry (2001) assert that case study research provides a holistic view of an event being studied. Robson (2002) describes case study approach as an investigation of a phenomenon in a real life context. Mitchell (1983) describes case study approach as a thorough examination of an event. Gilbert (2008) asserts that case study approach involved intensive study of cases selected.

Fellows & Liu (2008) state that case study allows an in-depth investigation of a research subject. Therefore, the methodological choice of a case study research design is informed by these depths of notable significant and its usefulness identified by some earlier researchers. Thus, in order to have a holistic understanding of the research propositions due to exploratory nature of this study, case study approach was employed with a view to providing richer approach to data collection, analysis, and interpretation. Given this, an exploratory case study approach using multiple sources of evidence, and multiple case studies were employed with a view to determining the critical success factors for PPP infrastructure projects among others.

5.12.2 **Types of case study research design**

Case study design can be in two forms: (i) single case; and (ii) a multiple cases (Yin, 1994). Barkley (2004) argues that the choice of either single case or multiple case designs is significantly influenced by the nature of the research study. It is on this premise that Yin (2009) identifies five rationales for the choice of single case as follows: (i) when a single case is critical in testing a theory; (ii) when the case is unique; (iii) when the case is representative (iv.) when a case is revelatory; and (v) when a case is longitudinal. However, Yin (2003) claims that using a single case study may not be relied on to draw conclusions about the population. On the other hand, Barkley (2004) argues that using a multiple case design allows generalisation of findings or replication within the cases. In this study, PPP infrastructure projects are unique, and it is unlikely to generalise the findings from a single project case study, particularly in developing countries where culture and stakeholders maturity are different. It is against this backdrop that multiple case studies were employed to investigate the research questions and generate more reliable data for inferences, and to minimise misrepresentation.

Therefore, a multiple case study design was adopted. This includes the selection of six PPP infrastructure projects in the study area and grouped it into two sets (see Section 5.12.3 for cases selection criteria). The first set comprised physical infrastructure/or civil and engineering PPP infrastructure projects within the study area. This includes the concession of Lekki-Epe Expressway (road), the concession of Muritala Mohammed Airport (MMA2), and the concession of seaports. The second set encompassed social infrastructure PPP projects. This includes the development of university hostel accommodation (i.e. Emerald Hostel at the University of Lagos); Kanti towers modern office complex; and the development of Tejuosho ultra-modern shopping complex. Yin (2009) affirms that the

results generated through multiple case studies are considered more compelling and robust. Thus, these will be more useful in developing a capability enhancement framework for stakeholder organisations in PPP infrastructure projects in Nigeria. The replication approach to multiple case studies is presented in Figure 5.6 as follows:

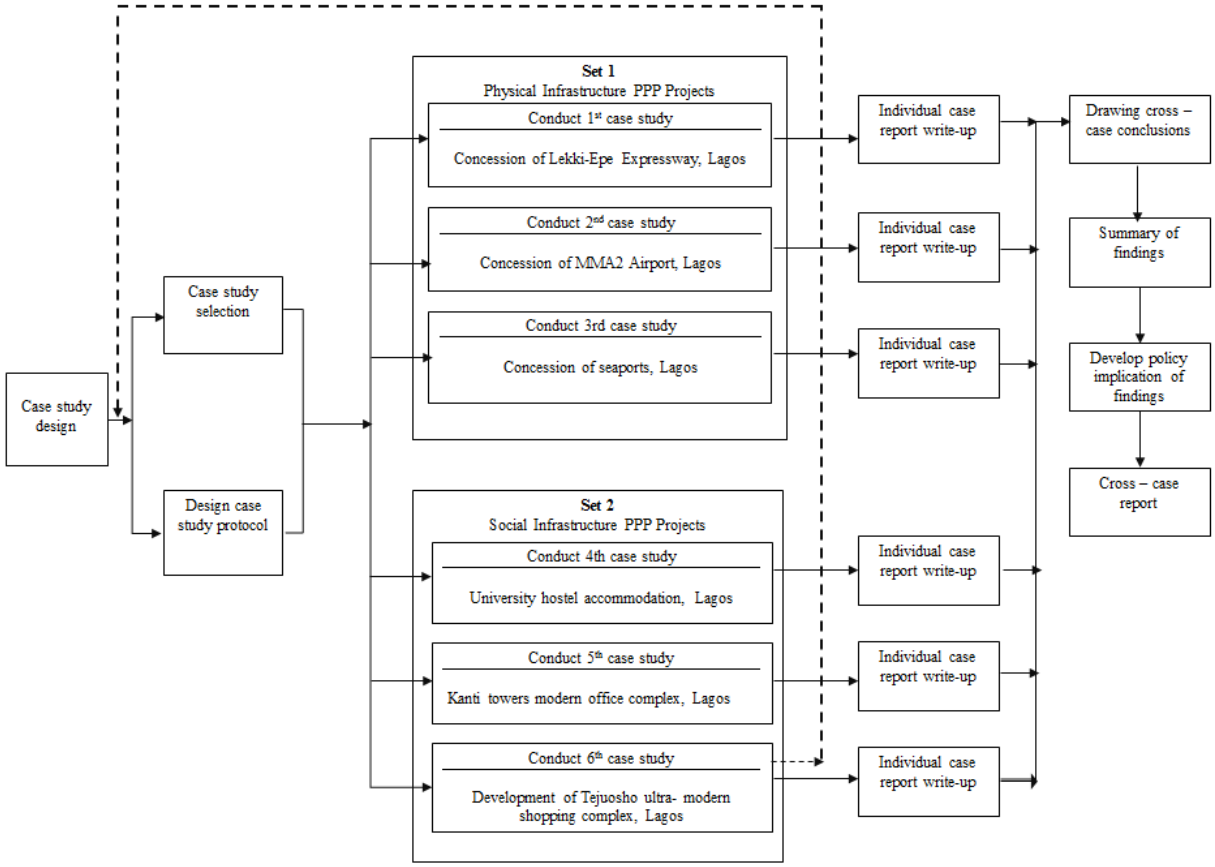


Figure 5.6: The replication approach to multiple case studies (Adapted from Yin, 2009, p. 57)

Figure 5.6 reveals that each case study consists of a whole study that convergent evidence is sought regarding the critical success factors that made these PPPs project successful; and current capability maturity levels of stakeholder organisations involved in these PPP projects. As shown in Figure 5.6, the cross-case analysis enables the researcher to compare the results among the six case studies. Thus, conclusions are drawn that is used in developing the framework for the study.

5.12.3 **Selection criteria for the case studies**

Amaratunga & Baldry (2001) argue that cases selections are unavoidably involved discretion and judgement. This is affirmed by Creswell (2009) that cases and participants are purposively selected by the researcher. Creswell (2009) further claims that the selection of the participants and cases does not necessarily involve a large number of participants and

cases. Given this, this study, therefore, selected six PPP infrastructure project case studies to include road, airport, seaport, university hostel accommodation, office complex, and ultra-modern shopping complex in Lagos metropolis, Nigeria. The rationales for choosing these PPP infrastructure project case studies are: (i) they are the first set of PPP infrastructure projects awarded by federal government and Lagos state government in Nigeria; (ii) the six selected case studies are in operation stage; (iii) it is apparent that the selected case studies are exhibiting appropriate characteristics of critical success factors that made the case studies successful; and (iv) the stakeholder organisations involved in these case studies are likely to determine their current capability maturity levels and possibility for continuous improvement.

5.13 Criticisms of case study research design

Earlier researchers acknowledged some advantages of using case study method. However, there are still shortcomings associated with the case study research design. For instance, Amaratunga & Baldry (2001) identify bias and lack of rigour as limitations of case study method. Miles & Huberman (1994) identify researcher bias in the selection of data and participants. Both of these involve the subjectivity of the researcher during the data collection stage, which pose a threat to the validity of the data (Miles & Huberman, 1994). Maxwell (2005) identifies reactivity (.i.e. the researcher influence on the individuals studied) as a threat in case study method. This is corroborated by Hammersley & Atkinson (1995) that the researcher's influence is impossible to eliminate. The fact that the researcher is part of the world he/she studies- is a powerful influence. Becker (1986) opines that researcher's 'feeling' for the subject may not be 'ruled-out', which affect the reliability of conclusions drawn. Berger (1983) claims that generalisation of findings to different phenomenon and context is difficult in case study research method. Yin (1981) recognises the limitations of the case study research method but asserts that these limitations are not inherent, but opportunities for improvement. Yin (1981) further advocates for refinement and standardisation of techniques with a view to overcoming the limitations in the case study research.

5.14 Measures undertaken in this study to overcome case study research shortcomings

Yin (2009) asserts that the quality of any given design can be judged by four tests: (i) construct validity; (ii) internal validity; (iii) external validity; and (iv.) reliability. In this

study, the steps taken in achieving the case study method's validity and reliability are briefly discussed as follows:

5.14.1 **Construct validity**

In order to ensure construct validity, multiple sources of evidence were employed during the data collection. This is supported by some notable researchers in the case study research. For instance, Yin (2003) identifies six sources of evidence as follows: (i) survey; (ii) archival records; (iii) interviews; (iv.) observations (direct and participant); (v) documentation; and (vi.) focus group. Liyanage & Villalba-Romero (2015) undertake quantitative measures to support qualitative approach in the four PPP case studies investigated to reduce bias among others. It is against this backdrop that quantitative measures; semi-structured interviews; archival records; and direct observations were employed in this study. Moreover, semi-structured interviews were conducted with five different stakeholders comprised public sector authorities (i.e. ministries, department, and agencies); concessionaires; local lenders/banks; consultants; and contractors involved in each case study. Therefore, the opinions of interviewees were compared with one another in each case study to eliminate bias and ensure construct validity among the interviewees. Since, multiple sources of evidence were employed, convergent lines of inquiry were developed, which is a process of triangulation. Thus, triangulation technique was employed in this study with a view to facilitating the findings generalisation and enhancing construct validity. This is supported by some earlier researchers that triangulation within a case study addresses the potential problem of construct validity (Maxwell, 2005; Fellows & Liu, 2008; Yin, 2009).

5.14.2 **Internal and external validity**

The use of replication logic as discussed previously in Figure 5.6 and the choice of multiple case studies addressed the problem of external validity. Having selected the cases for the study, and the development of replication logic as advocated by Yin (2009), this indicates that the external validity issue in the case study research has been adequately addressed. On the other hand, Yin (2009) argues that the techniques such as pattern matching, explanation building, time-series analysis, and logic models can be applied in either a single or a multiple case study. Thus, the cross-case synthesis technique was specifically employed to the analysis of a multiple case study (see Figure 5.6 for details), which makes the findings more robust than a single case study. It is on this premise that Yin (2009) asserts that the results generated through multiple case studies are considered more compelling and robust.

Thus, the issues of internal and external validity within the case study have been adequately addressed in this study.

5.14.3 **Reliability test**

In order to achieve reliability in case study research, Tashakkori & Teddlie (1998) advocate for researcher prolonged engagement in the field when conducting case study research. The authors further stated that it is important for the researcher to spend an appropriate time in the field with a view to building trust, learn the culture, and test for misinformation. The purpose of prolonged engagement is to provide scope for researchers by making them aware the multiple contextual factors and multiple perspectives on any given social scene (Tashakkori & Teddlie, 1998). Therefore, Tashakkori & Teddlie (1998) recommend persistent observations in the field by the researcher with a view to identifying the characteristics or aspects of the social scene that are most relevant to the particular question being investigated. These activities enhance the quality of information to be collected. In this study, multiple case studies (i.e. six PPP infrastructure project case studies) were conducted and the researcher employed direct observation as one of the evidence in each case study investigated. Thus, information obtained in this study is adjudged to be reliable, and the findings can be generalised.

Yin (2003) advocates for a case study protocol (CSP) to increase the reliability of the case study research. Given this, a CSP was developed in this study (see case study questions in Appendix H for details). CSP contained study questions that required answers. It was found very useful in the interviews with the respondents, as it assisted the researcher in keeping focused on the research objectives. All these and many other precautions ensured the reliability of the study. Also, it is imperative to determine the number of participants (respondents) in each case study. Therefore, for objectivity six participants comprised public sector authorities, concessionaires, local lenders/banks, consultants, and contractors who have attained managerial levels/or head of units in both public and private sectors were purposively selected in each case study. Thus, there are six case studies, thereby making a total of thirty- six participants interviewed. The structured interviews (see Appendix H for details) were conducted face-to-face and pictures of the case studies were taken.

5.15 Qualitative data analysis

The case studies data were analysed using thematic/content analysis technique. Content analysis is an appropriate means of assessing case studies (Murphy, 2008; Cheung, 2009).

The case studies were analysed both individually and collectively. The process of each case was analysed and compared. Failure Mode and Effect Analysis (FMEA) technique was also employed for the analysis of quantitative data obtained in the six PPP case studies. This is similar to the work of Liyanage & Villalba-Romero (2015) that used quantitative measures to quantify the key performance indicators and performance measures in the four case studies from four different EU countries. FMEA technique has been widely utilised in the manufacturing industry. However, the application of FMEA technique has not received much attention in the construction industry, especially in construction management and PPP studies. Few earlier researchers have applied the technique. For example, Murphy (2008) uses FMEA technique when studying product innovations within the construction procurement process. Murphy *et al*. (2011) employ FMEA technique when exploring a methodology for evaluating construction innovation constraints through project stakeholder competencies among others. Murphy (2008) further asserts that FMEA method is an appropriate tool that allows for subjective assessment of case study that produces empirical values for statistical analysis. It is on this premise that FMEA technique was employed in assessing the criticality of identified twenty-six success factors in the six PPP case studies.

FMEA is calculated by ranking the data into three sets: (i) occurrence (O); (ii) severity (S); and (iii) detection (D) (see Appendix H for details of the ranking criteria). Within this context, FMEA ranking criteria are as follows:

(i) Occurrence (O): the likelihood/frequency of occurrence of each success factor, on a 1-10 scale.
(ii) Severity (S): assesses the impact/severity of each factor to the success of the project on a 1-10 scale.
(iii) Detection (D): assesses the ability to detect each factor in the success of the project on a 1-10 scale.

FMEA is computed by the multiplication of occurrence (O); severity (S); and detection (D) of each identified twenty-six success factors in each case study. The resultants value termed 'risk priority number' (RPN) enables actions to be prioritised. In this study's context, the success factors that have higher RPN values are regarded as critical. For example, the decisional rule is that any success factor with an RPN value greater than 750 is said to be critical (see Figure 5.7 for details). The RPN value was used to determine the CSFs that made the six PPP project case studies investigated in this study successful. Thus, RPN values range from 1 to 1,000 (i.e. occurrence (O) multiply by severity (S) multiply by

detection (D), with the maximum score of 10 representing 10x10x10=1000). Hence, it is necessary to construct a scale using the rankings above. The scale appeared to be, '1' (not critical) to '1000' (critical) as illustrated in Figure 5.7 as follows:

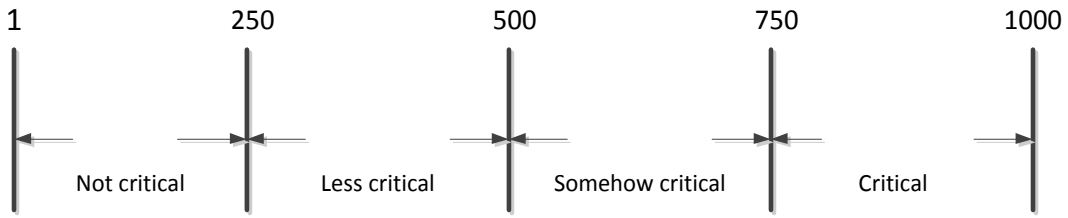
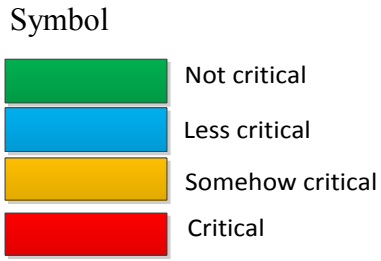


Figure 5.7: Criticality scale



5.16 Chapter summary

This chapter provides a detailed research methodology and methods employed to deliver the research outcome. The reasons for the choice of philosophy, research approach, and research strategy among others are discussed. The methodological choice of mixed methods that combined both the quantitative (survey) and the qualitative (case study and expert forum) data collection that are sequentially conducted in a single study are described and justified. Data collection techniques employed for both quantitative and qualitative research strands are discussed. For instance, under quantitative strand the design and administration of questionnaires together with statistical tests conducted to ensure the validity and the reliability are considered. Also, under qualitative strand including the case study research method, the selection criteria for cases, criticisms of the case study research and steps taken in achieving the case study method's validity and reliability are appropriately discussed. This chapter further presents the statistical techniques applied in the analysis of both the quantitative and qualitative data obtained. The next chapter provides the details of the analysis of data obtained through the questionnaire.

Chapter 6: SURVEY: DATA ANALYSIS, PRESENTATION AND DISCUSSION

6.1 Introduction

This chapter presents the analyses of data, presentation of results and the discussion of findings of the results generated through the questionnaires administered to the public sector authorities, concessionaires, local lenders/banks, consultants, and contractors involved in PPP infrastructure projects in Nigeria. The collected data were analysed using Statistical Package for Social Science (SPSS) through the use of descriptive statistics, mean score, Kruskal-Wallis test, and factor analysis. The analysed data were summarised and presented in tables with frequency distribution and percentages among others; this is aimed at giving a clear and concise representation of each of the variables. Also, efforts are made to discuss and relate the results obtained with previous studies, and a summary of these findings have been clearly itemised in line with the study objectives.

6.2 Analysis and discussion

This section was structured into two main parts. The first part contains the analysis of the respondents' demographic information. This includes the designation of respondents; academic qualifications; years of industrial experience; the number of PPP projects and types of PPP projects that the respondents' organisations have undertaken. The other parts were facilitated in relating to objectives 3 and 4 of the study.

6.3 Respondents demographic/background information

In order to capture a broad perception of stakeholders, the questionnaires were administered to five different stakeholder organisations involved in various PPP projects implementation in the study area. This includes public sector authorities; concessionaires; local lenders/banks; consultants; and contractors. Table 6.1 reveals the distribution of questionnaires administered to the respondents. The table indicates a total of 173 questionnaires administered, out of which 113 questionnaires representing 65.32% were completed and found suitable for the analysis. The effective response rate of 65.32% was higher compared to earlier PPP studies. For instance, Dulaimi *et al.* (2003) achieve a total response rate of 5.91%. Li *et al.*(2005c) record a response rate of 12%. Salman *et al.* (2007) achieve 9.4% response rate. Yuan *et al.* (2009) obtain a response rate of 13.02%. Abdul-Aziz (2012) achieves a response rate of 10.3%. Yong & Mustaffa (2013) record 9.83% response rate. Thus, the high response rate obtained in this study was due to the fact that the

questionnaires were distributed face-to-face (i.e. hand delivery) and follow-up through telephone contacts and text messages are carried-out to remind the respondents to complete the questionnaire due to their tight schedule. The limitations of administering questionnaires face-to-face are: it is very expensive; stressful; time-consuming, and not suitable when the studies involve the whole country or different countries.

Table 6.1 further shows the breakdown of respondents' category as follows: 31 questionnaires were distributed to public sector authorities, out of which 20 questionnaires were completed representing 64.52%. Also, 28 questionnaires were administered to concessionaires, out of which 25 questionnaires were returned representing 89.29%. Similarly, 22 questionnaires were distributed to local lenders/banks and the whole 22 questionnaires were retrieved representing 100.00%. Also, 51 questionnaires were administered to consultants, out of which 23 questionnaires representing 45.10% were returned. In the same manner, 41 questionnaires were distributed to contractors, out of which 23 questionnaires representing 56.10% were completed. It can be seen from Table 6.1 that consultants and contractors have a high number of questionnaires administered to them, despite a low rate of returns compared to other respondents. This occurred as results of fatigue due to many requests to complete questionnaires were targeted on consultants and contractors in the construction industry from different higher institutions and research institutes on a regular basis.

Table 6.1: Distribution of questionnaires

Stakeholders category	**Questionnaire Administered**	**Questionnaire Response**	**Percentage**
Public Sector Authorities	31	20	64.52
Concessionaires	28	25	89.29
Local Lenders/Banks	22	22	100.00
Consultants	51	23	45.10
Contractors	41	23	56.10
Total	**173**	**113**	**65.32**

Table 6.2 indicates the background information of respondents in terms of highest academic qualifications, years of industrial experience, and the number of PPP projects undertaken by respondents. The academic qualifications of respondents revealed that the highest percentage of respondents' academic qualifications were BSc/B.Tech (Bachelor's Degrees) with 46.9%, followed by MSc/M.Tech (Master's Degree) with 39.8%, and HND (Higher National Diploma) with 13.3%.

Table 6.2 further reveals the years of industrial experience of respondents. Thus, the calculated average years of industrial experience of respondents in public sector authorities; concessionaires; local lenders/banks; consultants; and contractors are as follows: 14 years; 10 years; 9 years; 12 years; and 11 years respectively. They have also involved in an overall average of 11 PPP infrastructure projects.

Table 6.2: Percentage distribution of respondents' demographic information

Respondents' profile	**Stakeholders**				
	Public sector authorities	Concessionaires	Local lenders/Banks	Consultants	Contractors
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
Educational qualification					
HND	3 (15.0)	4 (16.0)	1 (4.5)	1 (4.3)	6 (26.1)
BSc/ B.Tech	12 (60.0)	11 (44.0)	12 (54.5)	8 (34.8)	10 (43.5)
MSc/M.Tech	5 (25.0)	10 (40.0)	9 (41.0)	14 (60.9)	7 (30.4)
Total	**20 (100)**	**25 (100)**	**22 (100)**	**23 (100)**	**23 (100)**
Years of industrial experience					
< 5 years	3 (15.0)	7 (28.0)	7 (31.8)	2 (8.7)	1 (4.3)
6 – 10 years	2 (10.0)	7 (28.0)	5 (22.7)	8 (34.8)	10 (43.5)
11 – 15 years	6 (30.0)	5 (20.0)	9 (40.9)	8 (34.8)	9 (39.1)
16 – 20 years	4 (20.0)	3 (12.0)	1 (4.5)	3 (13.0)	2 (8.7)
> 20 years	5 (25.0)	3 (12.0)	-	2 (8.7)	1 (4.3)
Total	**20 (100)**	**25 (100)**	**22 (100)**	**23 (100)**	**23 (100)**
Number of PPP project involved					
1	8 (40)	10 (40)	6 (27.3)	7 (30.4)	7 (30.4)
2	4 (20)	11 (44)	5 (22.7)	7 (30.4)	9 (39.1)
3	3 (15)	3 (12)	1 (4.5)	4 (17.4)	7 (30.4)
4	1 (5)	1 (4)	1 (4.5)	4 (17.4)	-
5 & above	4 (20)	-	9 (40.9)	1 (4.3)	-
Total	**20 (100)**	**25 (100)**	**22 (100)**	**23 (100)**	**23 (100)**

Figure 6.1 indicates the number of respondents' organisations involvement in PPP infrastructure projects. It shows that all the respondents except contractor organisations have involved between 1-4 numbers of PPP infrastructure projects. Also, only respondents in public sector authorities; local lenders/banks; and consultants have participated in over 5 numbers of PPP infrastructure projects. Based on Table 6.2 and Figure 6.1, it can be

deduced that the respondents have adequate academic qualifications, suitable experience in the construction industry, and they have handled an appropriate number of PPP infrastructure projects in Nigeria. In the light of this, the information provided by these respondents was considered reliable and realistic.

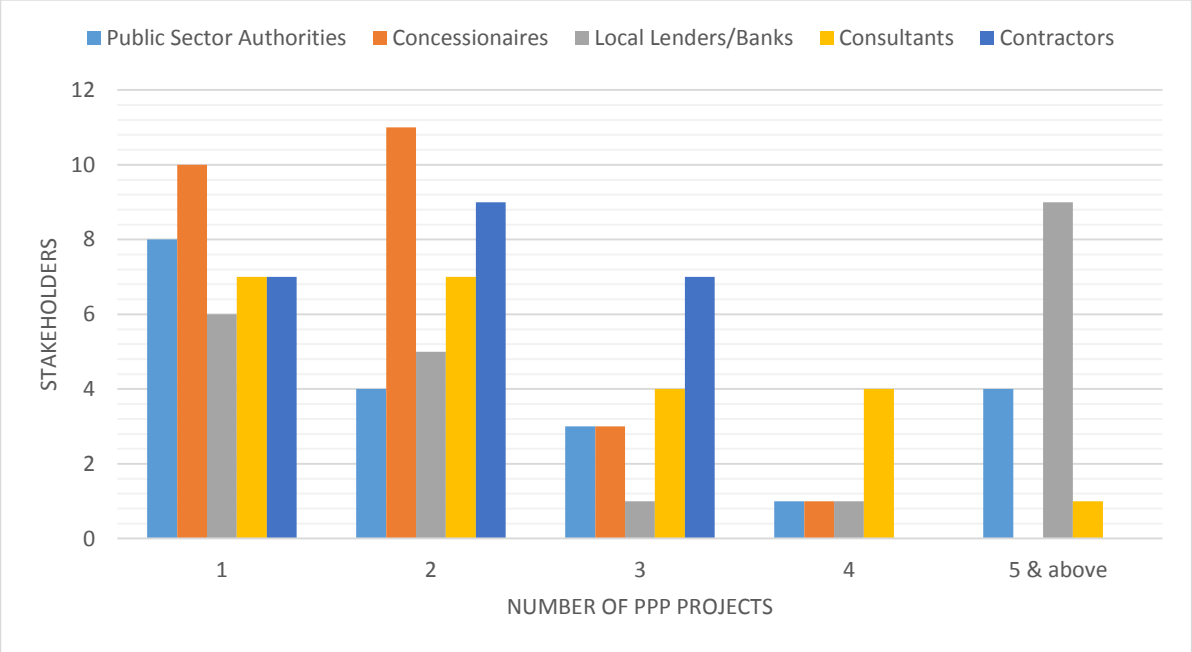


Figure 6.1: Number of PPP projects with which the respondents' organisations have been involved

Figure 6.2 shows the types of PPP infrastructure projects that the respondents have undertaken. It revealed that each respondent organisation had involved in more than one type of PPP infrastructure project. Figure 6.2 further indicates the most common PPP infrastructure projects that the respondents have been participated. These include: housing & office with 59.3%; followed by roads with 31.9%; markets shopping complex with 30.1%; university hostel with 29.2%; power & energy with 17.7%; airport with 15.9%; seaports with 15.9%. On the other hand, the least PPP infrastructure projects that the respondents have been involved includes: hospitals with 6.2%; IT & communication with 7.1%; rails with 7.1%; and water &sanitary with 8.8%. It is evident that Nigerian government has not fully embraced PPP for hospitals, IT and communication, rails, and water & sanitary infrastructure projects compared to developed countries, most especially the UK, Australia, Canada (see Figure 6.2 for details).

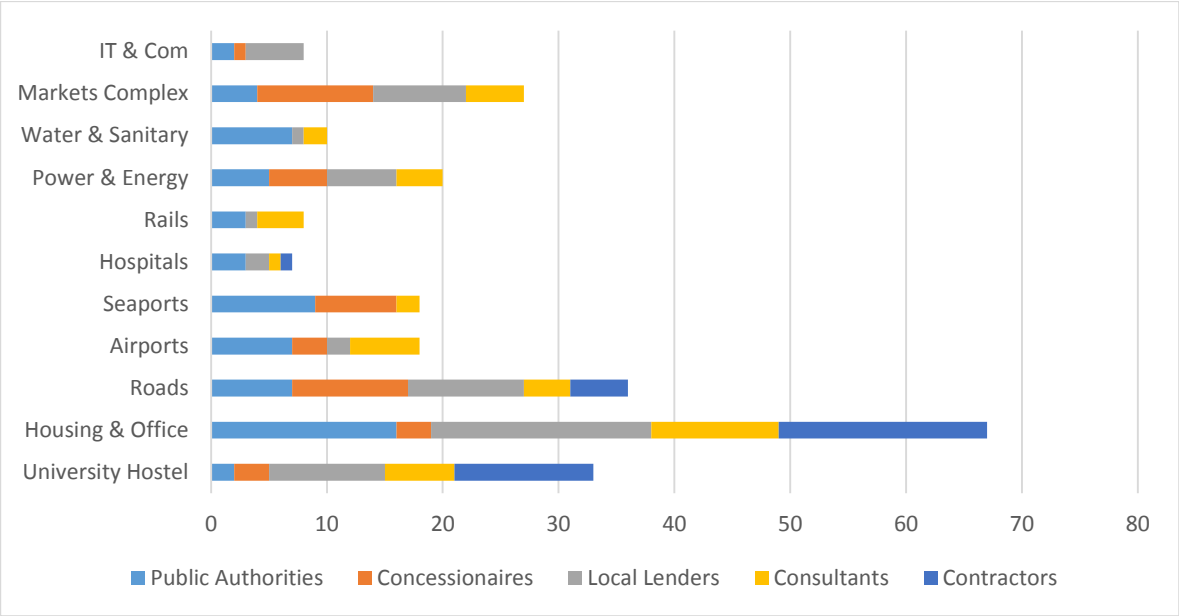


Figure 6.2: Types of PPP projects with which the respondents' organisations have been involved

It can also be deduced from Figure 6.2 that the respondents have engaged in a series of PPP infrastructure projects that comprised both the physical and social infrastructure. Given this, the respondents are adjudged of having knowledge of PPPs. Therefore, the researcher of this study is convinced that the respondents possess the adequate experience to supply reliable data for this study.

6.4 Identification and evaluation of the drivers and barriers of PPP infrastructure project implementation

One of the objectives of the study (objective 3) has been to identify and evaluate the drivers and barriers of PPP infrastructure project implementation. This objective is structured in two ways as follows:

i. The drivers for adopting PPPs for infrastructure projects, and
ii. Barriers to PPP infrastructure projects implementation.

The study, therefore, conducted the analysis separately and presented as follows:

6.4.1 Drivers for adopting PPPs for infrastructure projects

An analysis of the sample results, as shown in Table 6.3 indicates the ranking for each of the 17 identified drivers from five different stakeholder groups (respondents) comprising public sector authorities, concessionaires, local lenders, consultants, and contractors. The drivers that have the same mean score values were given the same rank. Thus, the analysis of the

ranking in terms of the overall or total mean score values reveals the most top six ranked drivers for adopting PPPs in Nigeria. This includes:

(i) Invoking discipline: private sector has more discipline for translating strategic intent into actions;
(ii) Invoking private sector skills, experience, access to technology, and innovation;
(iii) Better value for money;
(iv) Better risk allocation/sharing;
(v) Accelerate infrastructure provision; and
(vi) Improve maintainability (see Table 6.3 for details).

Table 6.3 further reveals the results of the ranking of the 17 identified drivers based on each five stakeholder group as follows:

Public sector authorities: The most top six ranked drivers by public sector authorities are: (i) better value for money; (ii) better risk allocation/sharing; (iii) invoking private sector skills, experience, access to technology, and innovation; (iv) invoking discipline: private sector has more discipline for translating strategic intent into actions; (v) improved quality of service; and (vi) improve maintainability.

Concessionaires: The most top six ranked drivers by concessionaires include: (i) invoking discipline: private sector has more discipline for translating strategic intent into actions; (ii) invoking private sector skills, experience, access to technology, and innovation; (iii) accelerate infrastructure provision; (iv) improve maintainability; (v) better value for money; and (vi) generate additional revenues.

Local lenders/Banks: The most top six ranked drivers by local lenders are: (i) better value for money; (ii) invoking private sector skills, experience, access to technology, and innovation; (iii) better risk allocation/sharing; (iv) accelerate infrastructure provision; (v) improve maintainability; and (vi) faster implementation.

Consultants: The most top six ranked drivers by consultants include; (i) invoking discipline: private sector has more discipline for translating strategic intent into actions; (ii) invoking private sector skills, experience, access to technology, and innovation; (iii) better risk allocation/sharing; (iv) accelerate infrastructure provision; (v) improved quality of service; and (vi) improve maintainability.

Contractors: The most top six ranked drivers by contractors are: (i) solve the problem of public sector budget constraints; (ii) better value for money; (iii) improved quality of service; (iv) invoking discipline: private sector has more discipline for translating strategic intent into actions; (v) invoking private sector skills, experience, access to technology, and innovation; and (vi) better risk allocation/sharing (see Table 6.3 for details).

Based on these findings, it is evident that the respondents strongly believed in the private sector expertise in discharging their duties. These findings are similar to previous studies, for instance, Li (2003) identifies risk transfer as one of top five drivers of PPPs in the UK. Chan *et al*. (2009) identify facilitate creative and innovative approaches and risk transfer among the top five drivers of PPPs in Hong Kong. Cheung (2009) identifies improve maintainability as one of most top five drivers of PPPs in Australia. Harris (2003) asserts that value for money is the principal justification for PPPs. Li *et al*. (2005a) state that value for money and risk allocation/sharing are major drivers of PPPs in the UK. On the other hand, the three least ranked drivers include: address short political tenures (government rush); reduced whole life costs; and improve buildability respectively. It is apparent from Table 6.3 that the mean score values for all the identified 17 drivers as rated by overall respondents ranged from 3.46 to 4.39. Therefore, it can be deduced that the entire 17 drivers are important for adopting PPP for infrastructure projects in Nigeria. This can be connected with the massive infrastructure deficit that can be speedily improved, delivered, and optimised through private sector involvement via PPPs.

Kruskal-Wallis test is used to determine whether there is statistically significant difference in the perception of respondents on the ranking of 17 identified drivers at a significance level of 5%. Based on the results of Kruskal-Wallis test (see Table 6.3), there is statistically significant difference in the perception of respondents on 4 (out of 17) identified drivers. The 4 drivers, where there is statistically significant difference include: invoking discipline-private sector has more discipline for translating strategic intent into actions (p-value is 0.012); better value for money (p-value is 0.031); better risk allocation/sharing (p-value is 0.029); and improve buildability (p-value is 0.019). Since, their p-values are less than 0.050 (see Table 6.3 for details).

Table 6.3: Ranking of the drivers for adopting PPP for infrastructure projects in Nigeria

Ref. code	Drivers	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
DR12	Invoking discipline: private sector has more discipline for translating strategic intent into actions	4.50	0.598	4	4.44	0.870	1	4.26	1.054	7	4.48	0.665	1	4.25	0.716	4	4.39	1	0.012*
DR11	Invoking private sector skills, experience, access to technology, and innovation	4.55	0.671	2	4.36	0.810	2	4.43	0.992	2	4.30	0.703	2	4.20	0.696	5	4.37	2	0.458
DR02	Better value for money	4.64	0.658	1	4.20	0.957	5	4.48	1.082	1	3.96	0.065	8	4.35	0.671	2	4.33	3	0.031*
DR01	Better risk allocation/sharing	4.55	0.739	2	3.92	0.909	15	4.43	0.992	2	4.30	0.559	2	4.20	1.056	5	4.28	4	0.029*
DR05	Accelerate infrastructure provision	4.27	0.935	8	4.36	0.810	2	4.30	0.876	4	4.26	0.752	4	4.05	1.050	10	4.25	5	0.804
DR14	Improve maintainability	4.41	0.666	6	4.36	0.638	2	4.30	0.063	4	4.04	0.878	6	4.15	0.489	9	4.25	5	0.271
DR04	Improved quality of service	4.45	0.596	5	4.00	0.913	10	4.13	1.058	11	4.13	0.548	5	4.30	0.657	3	4.20	7	0.414
DR03	Faster Implementation	4.41	0.811	6	3.96	1.042	12	4.30	0.876	4	3.96	1.022	9	4.25	0.716	5	4.18	8	0.327
DR10	Solve the problem of public sector budget constraints	4.00	0.816	13	4.12	0.850	7	4.22	0.600	8	4.00	0.953	7	4.45	0.759	1	4.16	9	0.340
DR16	Resolve problems of inefficiencies in traditional procurement	4.18	0.795	10	4.12	0.666	7	4.17	0.984	9	3.91	0.945	10	4.20	0.951	5	4.12	10	0.778
DR07	Enhanced public management	4.09	0.684	12	4.08	0.572	9	3.96	0.878	13	3.86	0.889	14	3.86	0.889	12	3.97	11	0.787
DR15	Resolve problems of corruption in public procurement	4.27	0.935	8	3.96	0.889	12	3.78	0.998	14	3.82	1.097	15	3.90	0.912	11	3.95	12	0.374
DR08	Generate additional revenues	3.91	0.811	15	4.16	0.943	6	4.13	0.920	11	3.91	0.793	10	3.60	0.883	14	3.90	13	0.087
DR06	Better incentives to perform	4.23	0.813	10	3.95	0.950	14	3.61	0.656	15	3.91	0.868	10	3.75	0.639	13	3.89	14	0.103
DR13	Improve buildability	3.95	0.785	14	4.00	0.913	10	4.17	0.937	9	3.87	0.920	13	3.25	0.910	17	3.85	15	0.019*
DR09	Reduced whole life costs	3.52	0.873	17	3.54	0.721	16	3.52	0.898	16	3.30	0.974	17	3.53	0.772	15	3.48	16	0.797
DR17	Address short political tenures	3.77	1.152	16	3.20	0.225	17	3.30	1.105	17	3.57	0.945	16	3.45	0.999	16	3.46	17	0.466

Significant at 5% Scale: 5–Very Important, 4–Important, 3–Moderately Important, 2–Of Little Importance, and 1–Unimportant

6.4.2 **Barriers to PPP infrastructure projects implementation**

As previously stated, this is the other part of research objective 3. Therefore, Table 6.4 indicates the analysis of the ranking of barriers in terms of importance by respondents.

Thus, the analysis of the ranking in terms of the overall or total mean score values for the 61 identified barriers ranging from 3.15 to 4.26; this indicates that all the identified barriers are considered by respondents as important (serious) barriers influencing PPP infrastructure projects in Nigeria. It can be seen further from Table 6.4 that 16 (out of 61) identified barriers have mean score values between 4.00 and 4.26, and the remaining 45 barriers have mean score values between 3.15 and 3.97. It is necessary to list the most top 16 barriers displayed mean score values ranging from 4.00 to 4.26. This includes: potential conflicts of interests among the stakeholders; politicisation of the concessions/political interference in procurement process; uncertainty of political environment/political instability; lack of transparency and accountability; poor financial projections and access to funds; inability of local institutions to provide long-term financing/equity financing; perceptions of a country/nation as high risk economy by foreign investors; difficulties in securing credit facility from banks; poor evaluation, monitoring, and due diligence by public sector; weak /poor enabling policies; inadequate consultation with stakeholders to create greater acceptance of PPPs; lack of strong political commitment for PPPs; public resentment due to tariff increases; weak/poor regulatory frameworks and enforcement; poor understanding of PPPs by politician/decision makers; and lengthy delays in negotiation/ delays due to lengthy bureaucratic procedures (see Table 6.4 for details).

Table 6.4 further reveals the ranking for each of the 61 identified barriers from five different stakeholder groups (respondents) comprising public sector authorities, concessionaires, local lenders/banks, consultants, and contractors as follows:

Public sector authorities: The most top six ranked barriers to PPP infrastructure projects implementation in Nigeria by public sector authorities are: (i) poor financial projections and access to funds; (ii) perceptions of a country/nation as high risk economy by foreign investors; (iii) inconsistent risk assessment and management/ poor risk management; (iv) problems of delays in receiving payments; (v) accusations of corruption and corrupt tendencies; and (vi) lack of strong political commitment for PPPs with their mean score values of 4.45, 4.45, 4.45, 4.45, 4.45, and 4.41 respectively (see Table 6.4 for details).

Concessionaires: The most top six ranked barriers to PPP infrastructure projects implementation in Nigeria by concessionaires include: (i) potential conflicts of interests among the stakeholders; (ii) lack of transparency and accountability; (iii) public resentment due to tariff increases; (iv) public opposition/public resistance; (v) weak/poor regulatory frameworks and enforcement; and (vi) lack of independence of regulatory body with their mean score values of 4.12, 4.08, 4.08, 4.08, 4.00, and 4.00 respectively (see Table 6.4 for details).

Local lenders/Banks: The most top six ranked barriers to PPP infrastructure projects implementation in Nigeria by local lenders/banks are: (i) lack of transparency and accountability; (ii) difficulties in securing credit facility from banks; (iii) inability of local institutions to provide long-term financing/equity financing; (iv) potential conflicts of interests among the stakeholders; (v) politicisation of the concessions/political interference in procurement process; and (vi) poor evaluation, monitoring, and due diligence by public sector with their mean score values of 4.52, 4.52, 4.48, 4.48, 4.39, and 4.39 respectively (see Table 6.4 for details).

Consultants: The most top six ranked barriers to PPP infrastructure projects implementation in Nigeria by consultants include: (i) uncertainty of political environment/political instability; (ii) potential conflicts of interests among the stakeholders; (iii) politicisation of the concessions/political interference in procurement process; (iv) poor financial projections and access to funds; (v) inability of local institutions to provide long-term financing/equity financing; and (vi) difficulties in securing credit facility from banks with their mean score values of 4.57, 4.52, 4.52, 4.52, 4.43, and 4.30 respectively (see Table 6.4 for details).

Contractors: The most top six ranked barriers to PPP infrastructure projects implementation in Nigeria by contractors are; (i) uncertainty of political environment/political instability; (ii) lack of capacity of private sector to fully meet the challenge of investing in a very large number of PPP projects; (iii) politicisation of the concessions/political interference in procurement process; (iv) inadequate consultation with stakeholders to create greater acceptance of PPPs; (v) weak judicial framework/weak judiciary for resolving PPP disputes; and (vi) law and regulation changes with their mean score values of 4.55, 4.45, 4.40, 4.25, 4.20, and 4.20 respectively (see Table 6.4 for details).

These findings are similar to the studies by Li *et al*. (2005b), Chan *et al.* (2006), Chan *et al.* (2010b) they identify lengthy bidding and negotiation process/ lengthy delays because of political debate as barriers to PPPs. But these study findings are in contrast to few earlier studies on barriers to PPP projects. For instance, KPMG (2010) reports a lack of competition and procurement inefficiencies as barriers to PPPs in Australia. El-Gohary *et al.* (2006) identify public opposition as a barrier to PPPs. Corbett & Smith (2006) identify lack of competition, lack of suitable skills and experience, lack of innovations in design, and lack of flexibility as barriers to PPPs. Therefore, it can be deduced that there are more barriers to PPP projects in Nigeria and probably in developing countries compared to developed countries.

In order to determine whether there is statistically significant difference in perceptions of the respondents on the ranking of 61 identified barriers. Kruskal-Wallis test was conducted at a significance level of 5%. Based on the results of Kruskal-Wallis test (see Table 6.4), there is statistically significant difference in perceptions of the respondents on 18 (out of 61) identified barriers. Since their p-values are less than 0.05; the 18 barriers include: politicisation of the concessions/political interference in procurement process; uncertainty of political environment/political instability; inability of local institutions to provide long-term financing/equity financing; difficulties in securing credit facility from banks; poor evaluation, monitoring, and due diligence by public sector; inconsistent risk assessment and management/poor risk management; lack of capacity of private sector to adequately meet the challenge of investing in a very large number of PPP projects; problems of delays in receiving payments; inefficiencies and management blunders of the concessionaire; macroeconomic fluctuations in currency or purchasing power; lack of experience and expertise in both the public sector and private investors (see Table 6.4 for details). This is not surprising that there was little difference on how each respondent from different organisations (i.e. public sector authorities, concessionaires, local lenders/banks, consultants, and contractors) perceived barriers to PPP projects. These affected their rankings and resulted in a significant difference in only 18 (out of 61) identified barriers to PPP projects implementation in Nigeria.

Table 6.4: Ranking of barriers that contribute to the failure of PPP infrastructure projects in Nigeria

Ref. code	Barriers	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
BR02	Potential conflicts of interests among the stakeholders	4.09	0.971	22	4.12	0.881	1	4.48	0.846	4	4.52	0.790	2	4.10	1.165	8	4.26	1	0.216
BR43	Politicisation of the concessions/Political interference in procurement process	4.32	0.945	13	3.64	0.952	26	4.39	0.941	5	4.52	0.730	2	4.40	0.995	3	4.25	2	0.004*
BR42	Uncertainty of political environment/political instability	4.23	0.869	14	3.76	0.970	17	4.13	0.815	14	4.57	0.788	1	4.55	0.759	1	4.25	2	0.005*
BR32	Lack of transparency and accountability	4.36	0.790	7	4.08	0.862	2	4.52	0.790	1	4.26	0.752	8	3.95	0.999	24	4.23	4	0.160
BR61	Poor financial projections and access to funds	4.45	0.800	1	3.96	1.060	7	4.17	0.984	12	4.52	0.665	2	4.05	4.146	13	4.23	4	0.248
BR21	Inability of local institutions to provide long -term financing/equity financing	4.36	0.953	7	3.84	0.898	13	4.48	0.593	3	4.43	0.788	5	3.70	1.261	39	4.16	6	0.017*
BR24	Perceptions of a country/nation as high risk economy by foreign investors	4.45	0.739	1	3.92	0.759	9	4.13	1.058	14	4.26	0.810	8	4.05	1.146	13	4.16	6	0.234
BR22	Difficulties in securing credit facility from banks	4.36	0.581	7	3.88	0.833	10	4.52	0.790	1	4.30	4.146	6	3.70	1.342	39	4.15	8	0.016*
BR59	Poor evaluation, monitoring and due diligence by public sector	4.32	0.894	12	3.64	0.907	26	4.39	0.839	5	4.30	0.635	6	4.10	1.165	8	4.15	8	0.018*
BR12	Weak /poor enabling policies	4.09	1.192	22	3.96	0.790	7	4.35	0.775	8	4.26	0.752	8	4.00	1.076	20	4.13	10	0.443
BR01	Inadequate consultation with stakeholders to create greater acceptance of PPPs	4.18	1.097	15	3.84	0.987	13	4.22	1.085	11	4.13	1.140	14	4.25	1.118	4	4.12	11	0.280
BR45	Lack of strong political commitment for PPPs	4.41	0.734	6	3.76	1.052	17	4.09	0.949	18	4.17	0.778	11	4.05	0.999	13	4.10	12	0.273
BR11	Public resentment due to tariff increases	4.14	1.037	17	4.08	1.077	2	4.09	0.668	18	3.78	0.671	36	4.05	0.759	13	4.03	13	0.343
BR13	Weak/poor regulatory frameworks and enforcement	4.36	0.902	7	4.00	0.816	5	3.96	0.878	29	3.96	1.224	24	3.80	1.436	33	4.02	14	0.479

Significant at 5% Scale: 5–Most Significant, 4– More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

Ref. code	Barriers	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
BR39	Poor understanding of PPPs by politician/decision makers	4.00	1.113	27	3.88	0.927	10	4.04	0.825	21	4.09	0.900	15	4.10	0.912	8	4.02	14	0921
BR33	Lengthy delays in negotiation/ Delays due to lengthy bureaucratic procedures	4.36	0.790	7	3.80	0.913	16	3.83	1.029	34	3.96	0.928	24	4.05	0.887	13	4.00	16	0.240
BR52	Inconsistent risk assessment and management/Poor risk management	4.45	0.739	1	3.52	1.085	37	4.13	0.757	14	4.00	0.953	21	3.75	1.446	37	3.97	17	0.034*
BR49	Lack of capacity of private sector to fully meet the challenge of investing in a very large number of PPP projects	4.14	0.774	17	3.68	1.145	23	4.04	0.065	21	3.48	1.344	50	4.45	0.945	2	3.96	18	0.038*
BR31	Lack of PPPs enabling environment	4.00	1.195	27	3.72	0.936	21	4.17	0.937	12	3.91	0.848	30	3.90	1.252	25	3.94	19	0.475
BR17	Weak judicial framework/weak judiciary for resolving PPP disputes	4.14	0.941	17	3.68	1.069	23	3.83	1.029	34	3.78	1.043	36	4.20	0.894	5	3.93	20	0.321
BR18	Law and regulation changes	4.00	0.873	27	3.60	1.041	30	3.87	1.014	31	3.91	0.900	30	4.20	1.056	5	3.92	21	0.284
BR23	Problems of delays in receiving payments	4.45	0.800	1	3.64	1.036	26	3.43	0.843	55	4.17	0.834	11	3.75	1.251	37	3.89	22	0.001*
BR05	Public opposition/Public resistance	3.77	1.110	46	4.08	0.997	2	4.04	0.878	21	3.78	0.850	36	3.80	1.152	33	3.89	22	0.631
BR47	Lack of capacity in public sector to develop and manage PPP process	4.14	0.774	17	3.48	1.046	41	3.87	0.815	31	4.04	1.107	18	3.90	1.373	25	3.89	22	0.118
BR36	Lack of independence of regulatory body	3.91	1.065	33	4.00	1.000	5	3.83	0.887	34	3.87	1.058	32	3.85	1.182	31	3.89	22	0.959
BR58	Inefficiencies and management blunders of the concessionaire	3.68	1.323	48	3.60	1.000	30	4.39	0.839	5	3.65	1.152	42	4.00	1.214	20	3.86	26	0.031*
BR60	Non-competitive bidding	3.91	1.151	33	3.48	1.358	41	4.04	0.825	21	3.70	1.185	41	4.05	1.050	13	3.84	27	0.523
BR14	Problems of administrative procedures and guidelines	4.14	0.941	17	3.76	0.831	17	3.74	1.176	44	4.00	1.000	21	3.55	1.050	48	3.84	27	0.375

Significant at 5% Scale: 5–Most Significant, 4– More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

Ref. code	Barriers	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
BR03	Public sector inability to manage consultants	4.05	0.999	25	3.40	0.866	47	4.04	1.107	21	3.78	0.998	36	3.90	0.788	25	3.83	29	0.071
BR27	Macroeconomic fluctuations in currency or purchasing power	3.68	0.780	48	3.56	0.961	34	4.30	0.765	9	3.96	0.825	24	3.60	1.188	45	3.82	30	0.033*
BR19	Low credibility of government policies	4.18	0.958	15	3.40	1.190	47	3.78	0.518	41	4.17	0.887	11	3.55	1.099	48	3.82	30	0.026
BR51	Lack of experience and expertise in both public sector and private investors	3.95	0.999	31	3.24	1.128	55	4.30	0.822	9	3.52	0.201	48	4.10	1.410	8	3.82	30	0.005*
BR16	Weak institutional capacity and PPPs strategy	3.86	0.941	38	3.76	1.012	17	3.65	1.112	50	4.00	1.000	21	3.80	1.056	33	3.81	33	0.823
BR38	Political reneging	3.91	1.019	33	3.52	1.005	37	3.78	0.795	41	4.04	0.928	18	3.80	0.894	33	3.81	33	0.369
BR25	Difficulty in obtaining foreign exchange/foreign exchange risk	3.86	1.167	38	3.72	0.936	21	4.09	1.125	18	3.83	1.154	34	3.50	1.277	50	3.80	35	0.417
BR44	Incapability of government to manage PPP projects	3.95	0.785	31	3.52	1.005	37	3.78	1.043	41	4.09	0.848	15	3.65	1.137	41	3.80	35	0.004*
BR40	Distortions of guarantees/incentives by governments	4.09	0.921	22	3.32	0.945	53	3.57	0.728	53	3.96	0.878	24	4.00	918	20	3.79	37	0.011*
BR35	Accusations of corruption and corrupt tendencies	4.45	0.739	1	3.12	1.166	60	3.57	0.237	53	3.65	0.935	42	4.15	1.089	7	3.79	37	0.001*
BR29	Land acquisition problems	3.59	1.098	51	3.84	0.898	13	4.13	0.920	14	3.96	1.224	24	3.40	1.231	54	3.78	39	0.172
BR53	Provision of incomprehensive up-front project information by public sector	4.00	0.816	27	3.56	0.917	34	3.87	1.058	41	3.65	1.229	42	3.65	1.089	41	3.75	40	0.595
BR30	Lack of coordination between national and regional governments	3.73	1.202	47	3.60	0.913	30	4.00	0.905	26	3.78	1.278	36	3.65	1.182	41	3.75	40	0.650
BR48	PPP process not clearly defined/lack of clarity	3.64	1.002	50	3.64	0.995	26	3.74	0.964	44	3.61	1.234	46	4.05	1.191	13	3.74	42	0.534
BR41	Lengthy delays due to political debate	3.82	1.259	43	3.24	1.200	55	3.61	0.891	51	4.04	0.928	18	3.85	0.875	31	3.71	43	0.106
BR34	Poor coordination between different public sector departments	4.05	1.046	25	3.40	1.000	47	3.83	0.650	34	3.30	1.063	54	3.90	1.119	25	3.70	44	0.033*
BR04	Cultural impediments include behaviours of people towards PPPs	3.91	0.921	33	3.88	0.833	10	3.83	1.302	34	3.26	1.096	56	3.60	0.883	45	3.70	44	0.178

Significant at 5% Scale: 5–Most Significant, 4– More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

Ref. code	Barriers	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
BR46	Complex decision making	3.86	0.990	38	3.52	0.963	37	3.61	0.891	51	3.39	1.033	53	4.10	1.021	8	3.70	44	0.088
BR37	Lack of completion in procurement procedures	3.82	0.853	43	3.12	0.054	60	3.70	0.974	46	3.96	0.878	24	3.90	1.119	25	3.70	44	0.023*
BR06	Lack of confidence and mistrust in PPPs	3.82	0.958	43	3.68	0.802	23	4.00	0.044	26	3.48	1.201	50	3.45	1.317	53	3.69	48	0.398
BR09	Low trust between public and private sector	3.45	1.262	55	3.60	0.913	30	3.83	1.072	34	3.87	1.140	32	3.65	1.565	41	3.68	49	0.571
BR20	Lack of public sector project development funds to promote PPPs	3.86	1.082	38	3.40	1.000	47	4.00	1.000	26	4.09	0.733	15	3.00	1.338	61	3.67	50	0.009*
BR20	Shortage of professionals to handle PPP projects	3.86	0.990	38	3.36	1.075	51	3.70	1.259	46	3.48	1.344	50	3.90	1.021	25	3.66	51	0.387
BR26	Perceived rise in tariffs	3.59	1.008	51	3.44	0.870	43	3.96	0.706	29	3.65	0.832	42	3.50	0.761	50	3.63	52	0.146
BR10	Lack of governmental assistance in resolving conflicts arising from toll charges	3.91	1.151	33	3.56	1.158	34	3.35	0.982	57	3.83	0.937	34	3.25	1.293	58	3.58	53	0.166
BR50	Difficulty in specifying work requirements and the quality of service	3.59	1.182	51	3.24	3.24	55	3.83	0.887	34	2.96	1.296	59	4.00	0.918	20	3.52	54	0.011*
BR15	Non availability of model concession agreements	3.45	0.963	55	3.44	1.044	43	3.70	1.259	46	3.57	0.896	47	3.20	1.281	60	3.47	55	0.616
BR28	Inadequate domestic capital markets	3.55	0.671	54	3.44	1.003	43	3.17	0.193	60	3.52	1.039	48	3.30	1.081	56	3.40	56	0.725
BR07	Fear over the implications of decisions made	3.45	1.057	55	3.32	0.988	53	3.70	0.703	46	3.22	1.043	57	3.25	1.293	58	3.39	57	0.472
BR57	Lack of flexibility	3.41	1.297	60	3.36	3.36	51	3.35	0.714	57	3.13	0.968	58	3.50	1.000	50	3.35	58	0.608
BR08	Societal discontent against the private sector	3.23	1.232	61	3.44	0.961	43	3.43	1.037	55	2.91	1.041	60	3.60	1.046	45	3.32	59	0.279
BR55	Unavailability of large construction companies to deliver PPP projects	3.45	0.963	55	3.16	0.898	59	3.22	1.166	59	3.30	1.222	54	3.40	1.314	54	3.31	60	0.834
BR56	Lack of innovations in design	3.45	1.011	55	3.20	0.957	58	3.00	0.603	61	2.78	0.998	61	3.30	1.081	56	3.15	61	0.059

Significant at 5% Scale: 5–Most Significant, 4– More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

6.5 Evaluation of success factors applicable for PPP infrastructure projects

The primary aim of the study has been to develop a stakeholder organisation capability enhancement framework (SOCEF) for PPP infrastructure projects. In order to achieve this goal, one of the objectives (i.e. objective 4) has been to evaluate success factors applicable for PPP infrastructure projects in Nigeria. Therefore, Table 6.5 reveals the analysis of the survey response data produced the mean score values for the 26 identified success factors (SFs) ranging from 3.70 to 4.50; this indicated that all the respondents considered these 26 SFs important for the successful implementation of PPP infrastructure projects in Nigeria. It can be deduced further from Table 6.5 that 22 SFs scored mean values greater than 4.00 and the remaining 4 SFs scored mean values between 3.70 and 3.87. The top six ranked SFs displayed mean score values ranging from 4.40 to 4.50 are:

i. Transparency in the procurement process
ii. Effective management control
iii. Good governance
iv. Project economic viability
v. Favourable investment environment; and
vi. Project technical feasibility (see Table 6.5 for details).

On the other hand, the three factors that were ranked least are political support, shared authority between public and private sectors, and multi – benefits objectives with the overall mean score values of 3.76, 3.71, and 3.70 respectively (see Table 6.5 for details). Although the aforementioned three factors were ranked least, but considering their mean score values greater than 3.50, it indicates that they are very important. This is supported by Badu *et al*. (2012) using the same scoring system (i.e. 5 point Likert scale) that an attribute was deemed critical if it had a mean score value of 3.5 or more.

Table 6.5 further reveals the ranking for each of the 26 identified SF from five different stakeholder groups (respondents) comprising public sector authorities, concessionaires, local lenders/banks, consultants, and contractors as follows:

Public sector authorities: The most top six ranked SFs to PPP infrastructure projects implementation in Nigeria by public sector authorities are: (i) project technical feasibility; (ii) thorough and realistic assessment of the cost and benefits; (iii) transparency in the procurement process; (iv) good governance; (v) effective management control; and (vi)

appropriate risk allocation and risk sharing with their mean score values of 4.77, 4.77, 4.64, 4.64, 4.55, and 4.55 respectively (see Table 6.5 for details).

Concessionaires: The most top six ranked SFs to PPP infrastructure projects implementation in Nigeria by concessionaires include: (i) transparency in the procurement process; (ii) good governance; (iii) effective management control; (iv) project economic viability; (v) technical innovation and technology transfer; and (vi) favourable investment environment with their mean score values of 4.64, 4.64, 4.56, 4.52, 4.52, and 4.44 respectively (see Table 6.5 for details).

Local lenders/Banks: The most top six ranked SFs to PPP infrastructure projects implementation in Nigeria by local lenders are: (i) favourable investment environment; (ii) good governance; (iii) transparency in the procurement process; (iv) effective management control; (v) competitive procurement process; and (vi) commitment and responsibility of public and private sectors with their mean score values of 4.61, 4.57, 4.52, 4.52, 4.48, and 4.48 respectively (see Table 6.5 for details).

Consultants: The most top six ranked SFs to PPP infrastructure projects implementation in Nigeria by consultants include: (i) favourable investment environment; (ii) availability of suitable and adequate financial market; (iii) project economic viability; (iv) sound economic policy; (v) project technical feasibility; and (vi) appropriate risk allocation and risk sharing with their mean score values of 4.70, 4.70, 4.57, 4.57, 4.52, and 4.48 respectively (see Table 6.5 for details).

Contractors: The most top six ranked SFs to PPP infrastructure projects implementation in Nigeria by contractors are: (i) project economic viability; (ii) project technical feasibility; (iii) appropriate project identification; (iv) transparency in the procurement process; (v) effective management control; and (vi) good governance with their mean score values of 4.40, 4.40, 4.30, 4.25, 4.25, and 4.25 respectively (see Table 6.5 for details).

These study findings are similar to other notable earlier researchers on SFs for PPP projects. For instance, Tiong (1996) identifies project technical feasibility as one of top six SFs for PPP projects. Jefferies *et al.* (2002) identify transparency in the procurement process as one of top three SFs for BOOT stadium project in Australia. Qiao *et al.* (2001) identify good governance, effective management control, and favourable investment environment among eight identified SFs for BOT projects in China. Zhang (2005b) identifies favourable investment environment as one of five main SFs for PPPs in infrastructure development.

Ismail & Ajija (2011) identify good governance as one of top five SFs for PPP projects in Malaysia. It can be deduced that there were mixed results in the ranking of SFs in different countries. These differences in the ranking of the SFs between countries highlight the uniqueness characteristics of PPPs to a particular country. It is not surprising considering the variations in the conditions of respective PPP projects in different countries. Also, the structure, culture, and maturity of concerned stakeholder organisations in PPP projects are different across the globe.

In order to test if there is any significant difference in the perceptions of the respondents from the public sector authorities, concessionaires, local lenders/banks, consultants, and contractors. Kruskal-Wallis test was undertaken at a significance level of 5%. The results of Kruskal-Wallis test indicated that except for 6 (out of 26) identified success factors (SFs); there is no statistically significant difference in the perceptions of respondents on the SFs for PPP projects (see Table 6.5). The 6 SFs where there is statistically significant difference in the perceptions of respondents are favourable investment environment; project technical feasibility; thorough and realistic assessment of the cost and benefits; availability of suitable and adequate financial market; technical innovation and technology transfer; and favourable legal framework. The p-value for these 6 SFs is less than 0.05 (see Table 6.5).

This difference could be attributed to the fact that the public sector (including ministries, department and agencies) and private sector (including concessionaires, local lenders, consultants, and contractors) as a separate entity with different ideology has divergent views as to the factors they consider suitable and critical to the PPP projects implementation. For instance, the public sector is concerned with the prompt execution of the projects, while the private sector is more concerned with the benefits and profits to be derived from the partnerships. Thus, this made the private sector perceived these 6 SFs (see Table 6.5) more important than the public sector for the successful implementation of PPP projects in Nigeria. This finding is similar to previous studies. For example, Ismail & Ajija (2011) found a statistically significant difference on 4 (out of 18) SFs in the perceptions of the public and private sectors in PPP projects in Malaysia.

Table 6.5: Ranking of success factors for PPP infrastructure projects in Nigeria

Ref. code	Success factors	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
SF01	Transparency in the procurement process	4.64	0.727	3	4.64	0.569	1	4.52	0.730	3	4.43	0.843	8	4.25	0.716	4	4.50	1	0.244
SF20	Effective management control	4.55	0.671	5	4.56	0.583	3	4.52	0.511	3	4.48	0.593	6	4.25	0.639	4	4.47	2	0.415
SF03	Good governance	4.64	0.581	3	4.64	0.490	2	4.57	0.590	2	4.22	0.736	16	4.25	0.851	4	4.46	3	0.124
SF24	Project economic viability	4.50	0.673	8	4.52	0.714	4	4.26	0.752	12	4.57	0.662	3	4.40	0.598	1	4.45	4	0.497
SF25	Favourable investment environment	4.32	0.780	14	4.44	1.158	6	4.61	0.583	1	4.70	0.470	1	4.00	0.725	12	4.41	5	0.004*
SF09	Project technical feasibility	4.77	0.429	1	4.12	1.092	19	4.17	0.650	13	4.52	0.593	5	4.40	0.883	1	4.40	6	0.025*
SF07	Thorough and realistic assessment of the cost and benefits	4.77	0.429	1	4.40	0.645	7	4.17	0.650	13	4.35	0.775	11	4.15	0.745	9	4.37	7	0.013*
SF02	Competitive procurement process	4.36	0.727	11	4.40	0.500	7	4.48	0.730	5	4.35	0.714	11	4.15	0.813	9	4.35	8	0.666
SF17	Sound economic policy	4.18	0.733	20	4.32	0.627	11	4.35	0.775	9	4.57	0.662	3	4.00	0.795	12	4.28	9	0.117
SF11	Commitment and responsibility of public and private sectors	4.36	0.727	11	4.24	0.831	13	4.48	0.730	5	4.30	0.703	13	4.00	0.795	12	4.28	9	0.300
SF18	Availability of suitable and adequate financial market	4.14	0.774	22	4.16	0.554	17	4.04	0.767	17	4.70	0.559	1	4.25	0.716	4	4.26	11	0.011*
SF26	Good partners' relationship	4.23	0.685	17	4.40	0.500	7	4.48	0.593	5	4.22	0.736	16	3.90	0.852	17	4.25	12	0.112
SF04	Well organized and committed public agency	4.36	0.658	11	4.24	0.723	13	4.39	0.656	8	4.22	0.902	16	3.90	1.210	17	4.22	13	0.794
SF19	Technical innovation and technology transfer	4.45	0.596	9	4.52	0.714	4	4.09	0.848	16	4.43	0.662	8	3.60	0.598	23	4.22	13	0.000*
SF10	Appropriate risk allocation and risk sharing	4.55	0.671	5	3.76	1.332	24	4.30	0.765	10	4.48	0.730	6	3.90	1.683	17	4.20	15	0.194
SF23	Clear project brief and client requirements	4.23	0.752	17	4.12	0.927	19	4.30	1.020	10	4.17	1.154	21	4.20	0.616	8	4.20	15	0.761
SF22	Appropriate project identification	4.23	0.752	17	4.36	0.810	10	3.96	0.475	19	4.13	0.694	22	4.30	0.571	3	4.20	15	0.165
SF16	Stable macroeconomic conditions	4.41	0.734	10	4.20	0.764	15	3.87	1.140	23	4.39	0.722	10	3.95	0.759	15	4.16	18	0.121

Significant at 5% Scale: 5–Most Significant, 4– More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

Ref. code	Success factors	Public Sector Authorities			Concessionaires			Local Lenders/Banks			Consultants			Contractors			Total	Total	Kruskal-Wallis Sig.
		N = 20			N = 25			N = 22			N = 23			N = 23			N = 113		
		Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Rank	
SF12	Strong and good private consortium	4.27	0.631	16	4.20	1.155	15	4.17	0.778	13	4.30	0.765	13	3.80	0.768	21	4.15	19	0.102
SF21	Consultation with end-users	4.05	1.046	23	4.28	0.737	12	4.04	0.976	17	4.26	0.752	15	3.95	1.432	15	4.12	20	0.908
SF08	Favourable legal framework	4.55	0.671	5	4.04	0.841	21	3.48	1.163	26	4.22	0.736	16	4.05	0.945	11	4.07	21	0.013*
SF13	Government involvement by providing a guarantee	4.32	0.945	14	4.16	0.943	17	3.96	0.825	19	4.22	0.998	16	3.60	1.046	23	4.05	22	0.089
SF05	Social support	4.18	0.733	20	3.80	0.764	23	3.96	0.878	19	3.78	0.850	24	3.65	1.040	22	3.87	23	0.277
SF15	Political support	3.73	1.032	26	3.92	0.862	22	3.65	0.885	24	3.65	1.229	26	3.85	0.745	20	3.76	24	0.885
SF06	Shared authority between public and private sectors	3.95	0.785	25	3.44	1.044	26	3.91	0.949	22	3.91	1.083	23	3.35	0.988	26	3.71	25	0.500
SF14	Multi – benefits objectives	4.05	0.785	23	3.72	1.021	25	3.57	0.788	25	3.70	0.765	25	3.45	0.759	25	3.70	26	0.184

Significant at 5% Scale: 5–Most Significant, 4– More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

6.6 Factor analysis on drivers, barriers and success factors for PPP infrastructure projects

In an attempt to achieve more interpretable results and determine the underlying relationships between the identified 17 drivers (see Table 6.3), identified 61 barriers (see Table 6.4), and identified 26 success factors (see Table 6.5), factor analysis was conducted. This is supported by notable earlier researchers in PPP studies and construction management research. For instance, Li *et al.* (2005c) carry out factor analysis when exploring critical success factors (CSFs) for PPP/PFI projects in the UK. Zhang (2005b) conduct factor analysis when studying CSFs for PPPs in infrastructure development. Chan *et al.*(2004) employ factor analysis when exploring CSFs for partnering on construction projects. Yang *et al.* (2009) undertake factor analysis when studying CSFs for stakeholders management in construction projects. Awodele (2012) conducts factor analysis when developing a framework for managing risk in privately financed market projects in Nigeria. Famakin *et al*. (2012) employ factor analysis when assessing success factors for joint venture construction projects in Nigeria among others. Therefore, the choice of factor analysis technique was informed by these depths of usage by other researchers in construction management research, particularly in PPP studies, and its usefulness as a common technique used to determine the underlying relationships among variables. In this study, factor analysis was conducted to capture any existing relationship between the drivers, barriers, and success factors for PPP projects.

6.7 Steps involved in conducting factor analysis

According to Pallant (2010) there are three main steps in conducting factor analysis namely: (i) assessment of the suitability of the data; (ii) factor extraction; and (iii) factor rotation and interpretation. These steps are briefly explained as follows:

6.7.1 Assessment of the suitability of the data

The suitability of the data for factor analysis was carried out using the two issues suggested by Pallant (2010) this includes the sample size and the strength of the relationship between the variables. In term of the sample size, K'Akumu *et al.* (2013) assert that an adequate sample size was needed to ensure the suitability and reliability of the data for factor analysis. Thus, there are various suggestions on the most suitable sample size for factor analysis. For instance, Hinton *et al*. (2004), Pallant (2007) recommend a minimum ratio of two responses for every item (variable). Tabachnick & Fidell (2007) suggest that there should be 150 - 300

within a sample for factor analysis. Pallant (2010) argues that there is little agreement amongst authors concerning how large a sample should be for factor analysis, but recommends larger samples. Therefore, it is necessary to shed light on sample size employed by earlier researchers when conducting factor analysis. For example, Akintoye (2000) conducts factor analysis with a sample size of 84 when analysing the factors influencing project cost estimating practice. Takim *et al*. (2004) employ factor analysis with a sample size of 93 when investigating measures of construction project success in Malaysia. Li *et al.* (2005c) undertake factor analysis with a sample size of 61 when assessing critical success factors for PPP/PFI projects in the UK construction industry. Awodele (2012) conducts factor analysis with a sample size of 93 when developing a framework for managing risk in privately financed market projects in Nigeria. Based on these findings, this study is adjudged suitable for factor analysis with a sample size of 113.

The second issue raised by Pallant (2010) in assessing the suitability of data for factor analysis is the strength of the relationship between the variables. Therefore, evaluating the adequacy of data collected for factor analysis was conducted using Statistical Package for the Social Sciences (SPSS). This is supported by Gorsuch (1983) and Pallant (2010); they assert that before embarking on factor analysis, the data must be assessed for suitability for factor analysis using Kaiser-Meyer-Olkin (KMO) and Bartlett's tests of Sphericity. Thus, Table 6.6, Table 6.7 and Table 6.8 reveal the results of Kaiser-Meyer-Olkin (KMO) and Bartlett's tests of Sphericity on drivers, barriers and success factors respectively. The KMO values indicated the sampling adequacy to be 0.765 for the drivers, 0.751 for the barriers, and 0.784 for the success factors, which exceeds the 0.6 value that Kaiser (1974) suggests as satisfactory for accurate completion of factor analysis. This is affirmed by Tabachnick & Fidell (2007) that the KMO index ranges from 0 to 1, with 0.6 suggested as the minimum value for a good factor analysis. The KMO values further revealed that there are enough items predicted by each factor.

Table 6.6: The results of Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity on drivers

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.765
Bartlett's Test of Sphericity	
Approximate Chi-square	1021.000
Df	136
Sig.	0.000

Table 6.7: The results of Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity on barriers

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.751
Bartlett's Test of Sphericity	
Approximate Chi-square	5434.000
Df	1830
Sig.	0.000

Table 6.8: The results of Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity on success factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.784
Bartlett's Test of Sphericity	
Approximate Chi-square	1166.000
Df	325
Sig.	0.000

Bartlett's test of Sphericity indicated whether or not the variables are correlated enough to enable factor analysis to be conducted. Thus, Bartlett (1954) argues that the significance should be less than a value of 0.05 i.e. Bartlett's test of Sphericity should be significant ($p < .05$) for the factor analysis to be considered appropriate. This is corroborated by Hinton *et al*. (2004) and Pallant (2007) that the significance value should be 0.05 or less. It is evident from Table 6.6, Table 6.7 and Table 6.8 that the significance values for the drivers, barriers and success factors shown the recorded values of 0.000 respectively. This implies that the correlation is strong enough to be accurate and suitable for conducting factor analysis. Also,

Sphericity for the drivers, barriers and success factors are found very significant (i.e. Bartlett's test of Sphericity= 1021, 5434 and 1166 respectively). Thus, the data were confirmed satisfactory and appropriate for use in factor analysis.

6.7.2 **Factor extraction**

Having confirmed that the data were suitable for factor analysis; the next step according to Pallant (2010) is factor extraction. This involves the identification of a relatively small number of factors that can be used to represent relationships among a set of many interrelated variables (Kleinbaum *et al*., 1988; Norusis, 1992). Pallant (2010) argues that there is a variety of approaches that can be used to identify (extract) the number of underlying factors. These include: principal components; principal factors; image factoring; maximum likelihood factoring; alpha factoring; unweighted least squares; and generalised least squares. The most commonly used approach is Principal Component Analysis (PCA) (Pallant, 2010). Thus, this study employed PCA to generate the interpretable factors. This is supported by Fox & Skitmore (2007) that PCA successively extracts factors based on the maximum variance between the variables. Pallant (2010) further states that there some techniques that can be used to assist in the decision concerning the number of factors to be retained. These techniques include Kaiser's criterion or eigenvalue, scree plot, and parallel analysis (Pallant, 2010).

This study, therefore, employed PCA approach in conjunction with Kaiser's criterion or eigenvalue, and the scree plot decision criteria when deciding on the number of factors to be retained. This is supported by K'Akumu *et al*. (2013) that eigenvalues are useful in factor analysis as a "deciding criteria as to what are the most important factors to be considered in the analysis". For instance, the default position in making a decision about the number of factors to be considered in statistical analysis is the "eigenvalue greater than 1.0 rule" (Thompson, 2004; Leech *et al*., 2005; Pallant, 2010; K'Akumu *et al.,* 2013). This study strictly followed the rule under Kaiser's criterion or Eigenvalues, that only factors with an eigenvalue greater than 1.0 were retained for further investigation (see Tables 6.9 to 6.11 and Appendix B, D & F for details). In the scree plot, the plots as generated by the SPSS software was inspected to find a point at which the shape of the curve changes direction and becomes horizontal (see Figures 6.3 to 6.5 for details).

6.7.3 **Factor rotation and interpretation**

This is the third step according to Pallant (2010) who says once the numbers of factors have been determined; the next step is to interpret them. Then, the factors were "rotated". This does not change the underlying factors rather it presents the pattern of loadings in a manner that is easier to interpret (Pallant, 2010). There are two main approaches to the rotation, resulting in either orthogonal or oblique factor solutions. Tabachnick & Fidell (2007) assert that orthogonal rotation results in solution that are easier to interpret and report, while oblique approaches allow for the factors to be correlated, but they are more difficult to interpret, describe and report. It is on this premise that this study employed orthogonal approach solution. Pallant (2010) further argues that within the two categories of rotational approaches, there are some different techniques provided by SPSS. For example, the variants of orthogonal include: varimax; quartimax; and equamax. On the other hand, the variants of oblique are direct oblimin and promax.

Pallant (2010) asserts that varimax method is the most commonly used orthogonal approach because it minimises the number of variables that have high loadings on each factor, thereby resulting in a clean and easier interpreted result. Given this, a varimax method is employed in this study. This is supported by previous researchers. For instance, Grover & Vriens (2006) seek for the usage of a varimax method for orthogonal solutions. Therefore, principal factor extraction with varimax rotation was carried out on the drivers, barriers and success factors for PPP infrastructure projects. The results are shown in Tables 6.9-6.11 respectively and (see Appendix C, E & G for details). The loadings that result from carrying out the varimax rotation are correlation coefficients. Tabachnick & Fidell (1996) assert that the value of the measure of sampling activity (MSAs) of all the factors is to be greater than 0.3. In this study, the value of the MSA as indicated in Table 6.9 ranging from 0.426 to 0.814 for drivers. Table 6.10 reveals MSA value ranging from 0.342 to 0.822 for barriers. Table 6.11 indicates MSA value ranging from 0.341-0.797 for success factors. This implies that there is no need to eliminate any variable from the analysis. This approach is corroborated by earlier researchers. For instance, Leech *et al.* (2005) assert that factor loadings of less than 0.3 are considered low. Kline (2002) argues that variables with factor loading of 0.30 or higher can be considered significant. Brown (2009) claims that variables that loading near 1 are clearly important in the interpretation of the factor, and variables that loading near 0 is clearly unimportant.

In this regard, Principal Component Analysis (PCA) was conducted on 17 identified drivers for adopting PPPs for infrastructure projects. Table 6.9 indicates the initial eigenvalues and factor loading on the drivers (see Appendix B & C for details). Also, the first five components had eigenvalues greater than 1. This is further confirmed using scree plot (see Figure 6.3) as recommended by previous researchers (e.g. Pallant, 2010) among others. Therefore, the first five components were retained for further investigation after satisfying both Kaiser's criterion or eigenvalues (i.e. eigenvalues greater than 1) and scree plot (see Figure 6.3 for details) criteria. Table 6.9 contains the five factors with their eigenvalues, the percentage of the variance, the cumulative percentage of the variance in each factor, and the factor loading. It can be seen from Table 6.9 that the eigenvalues for the five factors retained were ranging from 1.536 to 4.783. The total variance explained by the 1st factor is 28.136% while the last 5th factor explained a total variance of 7.036%. The total variance explained by extracted five factors accounted for 61.760% (see Appendix B for details).

Table 6.9: Principal factor extraction, varimax rotation and total variance explained on drivers for adopting PPPs

Ref. code	Principal factor	Factor Loading	Initial Eigenvalues		
			Total	% of Total Variance Explained	Cumulative % of Variance Explained
Factor 1: Innovation and efficiency gains					
F1/ DR05	Accelerate infrastructure provision	0.795	4.783	28.136	28.136
F1/ DR11	Invoking private sector skills, experience, access to technology, and innovation	0.740			
F1/ DR12	Invoking discipline: private sector has more discipline for translating strategic intent into actions	0.598			
F1/ DR16	Resolve problems of inefficiencies in traditional procurement	0.587			
F1/ DR01	Better risk allocation/sharing	0.537			
F1/ DR10	Solve the problem of public sector budget constraints	0.504			
Factor 2: Strengthening public infrastructure					
F2/ DR02	Better value for money	0.814	1.661	9.773	37.909
F2/ DR03	Faster implementation	0.747			
F2/ DR04	Improved quality of service	0.699			
Factor 3: Delivering to time and cost					
F3/ DR09	Reduced whole life costs	0.708	1.477	8.691	46.600
F3/ DR07	Enhanced public management	0.699			
F3/ DR06	Better incentives to perform	0.533			
F3/ DR08	Generate additional revenues	0.426			
Factor 4: Construction and operational performance					
F4/ DR13	Improve build ability	0.720	1.381	8.125	54.725
F4/ DR14	Improve maintainability	0.637			
Factor 5: Engender accountability in fund utilization					
F5/ DR17	Address short political tenures (government rush)	0.779	1.196	7.036	61.760
F5/ DR15	Resolve problems of corruption in public procurement	0.665			

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Rotation converged in 6 iterations

(See Section 6.8.1 of Chapter 6 for full discussion of the principal factors).

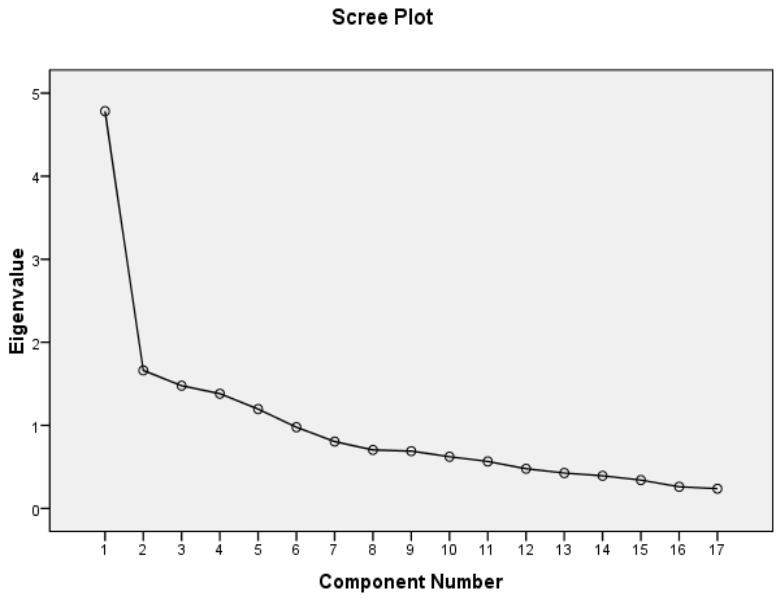


Figure 6.3: Scree plot showing extracted factors on 17 identified drivers for PPPs

As shown in Table 6.9 principal factor extraction with a varimax rotation was conducted on the identified 17 drivers for adopting PPPs for infrastructure projects. The rotation matrix converged in 6 iterations. The result of analysis grouped the 17 identified drivers into 5 principal interpretable factors with their components (see Table 6.9 for details). The 5 principal factors derived are interpreted as follows:

1. Factor 1: Innovation and efficiency gains
2. Factor 2: Strengthening public infrastructure
3. Factor 3: Delivering to time and cost
4. Factor 4: Construction and operational performance
5. Factor 5: Engender accountability in fund utilisation (see Section 6.8.1 of Chapter 6 for full discussion of the factors).

Similarly, PCA was carried out on 61 identified barriers to PPP projects. Table 6.10 reveals both initial eigenvalues and factor loading on barriers (see Appendix D & E for full details). It is evident that the first 16 components had eigenvalues greater than 1 (see Appendix D for details). This confirmed the assertion of Pallant (2010) that Kaiser's criterion or eigenvalues had been criticised for retaining too many factors in some situations. In this case, 16 components are too many to be retained. In the light of this, scree plot is undertaken in making criteria decision, as it was been advocated by earlier researchers. For instance, Pallant (2010) recommends scree plot to check the number of components to be retained for

further investigation. Using scree plot (see Figure 6.4 for details) and inspecting to find a point at which the shape of the curve changes direction and become horizontal. It is evident that the first ten components concurred with scree plot (see Figure 6.4 for details). Based on this, the first 10 components were retained for further investigation after meeting both Kaiser's criterion or eigenvalues (i.e. eigenvalues greater than 1) and scree plot (see Figure 6.4 for details) criteria.

Also, Table 6.10 contains the 10 components/factors with their eigenvalues; percentage of the variance; cumulative percentage of the variance in each factor; and factor loading. It can be seen from Table 6.10 that the eigenvalues for the 10 factors retained ranged from 1.536 to 18.328. Also, the total variance explained by the 1st factor is 30.046%, while the last 10th factor explained a total variance of 2.517%. Thus, the total variance explained by extracted 10 factors amounted to 63.930% (see Appendix D for details).

Table 6.10: Principal factor extraction, varimax rotation and total variance explained on barriers to PPPs

Ref. code	Principal factor	Factor Loading	Initial Eigenvalues		
			Total	% of Total Variance Explained	Cumulative% of Variance Explained
Factor 1: Public and private partners' capacity deficiencies					
F1/BR55	Unavailability of large construction companies to deliver PPP projects	0.760	18.328	30.046	30.046
F1/BR50	Difficulty in specifying work requirements and the quality of service	0.758			
F1/BR56	Lack of innovations in design	0.723			
F1/BR51	Lack of experience and expertise in both public sector and private investors	0.671			
F1/BR34	Poor coordination between different public sector departments	0.657			
F1/BR57	Lack of flexibility	0.651			
F1/BR54	Shortage of professionals to handle PPP projects	0.616			
F1/BR53	Provision of incomprehensive up-front project information by public sector	0.614			
F1/BR49	Lack of capacity of private sector to fully meet the challenge of investing in a very large number of PPP projects	0.546			
F1/BR52	Inconsistent risk assessment and management/Poor risk management	0.511			
F1/BR39	Poor understanding of PPPs by politician/decision makers	0.508			
F1/BR47	Lack of capacity in public sector to develop and manage PPP process	0.466			
F1/BR58	Inefficiencies and management blunders of the concessionaire	0.415			
F1/BR03	Public sector inability to manage consultants	0.344			

Ref. code	Principal factor	Factor Loading	Initial Eigenvalues		
			Total	% of Total Variance Explained	Cumulative% of Variance Explained
Factor 2: Weak political willingness and administrative bottleneck					
F2/BR45	Lack of strong political commitment for PPPs	0.690	3.604	5.908	35.954
F2/BR44	Incapability of government to manage PPP projects	0.688			
F2/BR37	Lack of completion in procurement procedures	0.655			
F2/BR14	Problems of administrative procedures and guidelines	0.381			
F2/BR32	Lack of transparency and accountability	0.357			
Factor 3: Weak economic conditions and environmental related problems					
F3/BR21	Inability of local institutions to provide long term financing/equity financing	0.788	3.119	5.113	41.067
F3/BR22	Difficulties in securing credit facility from banks	0.739			
F3/BR25	Difficulty in obtaining foreign exchange/foreign exchange risk	0.655			
F3/BR20	20. Lack of public sector project development funds to promote PPPs	0.652			
F3/BR24	Perceptions of a country/nation as high risk economy by foreign investors	0.606			
F3/BR28	Inadequate domestic capital markets	0.535			
F3/BR27	Macroeconomic fluctuations in currency or purchasing power	0.455			
F3/BR61	Poor financial projections and access to funds	0.450			
F3/BR19	Low credibility of government policies	0.440			
F3/BR23	Problems of delays in receiving payments	0.399			
F3/BR29	Land acquisition problems	0.342			
Factor 4: Social related problems					
F4/BR06	Lack of confidence and mistrust in PPPs	0.749	2.711	4.445	45.512
F4/BR07	Fear over the implications of decisions made	0.743			
F4/BR05	Public opposition/Public resistance	0.692			
F4/BR11	Public resentment due to tariff increases	0.567			
F4/BR31	Lack of PPPs enabling environment	0.474			
Factor 5: Corruption and inadequate governmental actions in PPPs					
F5/BR35	Accusations of corruption and corrupt tendencies	0.822	2.376	3.896	49.407
F5/BR33	Lengthy delays in negotiation/ Delays due to lengthy bureaucratic procedures	0.680			
F5/BR30	Lack of coordination between national and regional governments	0.502			
F5/BR38	Political reneging	0.495			
F5/BR40	Distortions of guarantees/incentives by governments	0.475			
F5/BR10	Lack of governmental assistance in resolving conflicts arising from toll charges	0.456			
F5/BR12	Weak /poor enabling policies	0.429			
Factor 6: Low social acceptability					
F6/BR09	Low trust between public and private sector	0.741	2.164	3.547	52.955
F6/BR08	Societal discontent against the private sector	0.626			
F6/BR16	Weak institutional capacity and PPPs strategy	0.620			
F6/BR04	Cultural impediments include behaviours of people towards PPPs	0.411			
Factor 7: Legal and regulatory related problems					
F7/BR18	Law and regulation changes	0.766	1.867	3.060	56.015
F7/BR17	Weak judicial framework/weak judiciary for resolving PPP disputes	0.552			
F7/BR13	Weak/poor regulatory frameworks and enforcement	0.540			
F7/BR15	Non availability of model concession agreements	0.451			
F7/BR36	Lack of independence of regulatory body	0.447			

Factor 8: Poor internal and external stakeholders' relationships					
F8/BR01	Inadequate consultation with stakeholders to create greater acceptance of PPPs	0.596	1.686	2.764	58.779
F8/BR02	Potential conflicts of interests among the stakeholders	0.488			
F8/BR26	Perceived rise in tariffs	0.433			
F8/BR48	PPP process not clearly defined/lack of clarity	0.364			
Factor 9: Delay and politicization of the concessions					
F9/BR46	Complex decision making	0.555	1.607	2.634	61.413
F9/BR41	Lengthy delays due to political debate	0.526			
F9/BR43	Political interference in procurement process	0.502			
F9/BR42	Uncertainty of political environment/political instability	0.491			
Factor 10: Absence of competition and due diligence					
F9/BR60	Non-competitive bidding	0.763	1.536	2.517	63.930
F9/BR59	Poor evaluation, monitoring and due diligence by public sector	0.485			

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Rotation converged in 22 iterations

(See Section 6.8.2 of Chapter 6 for full discussion of the principal factors).

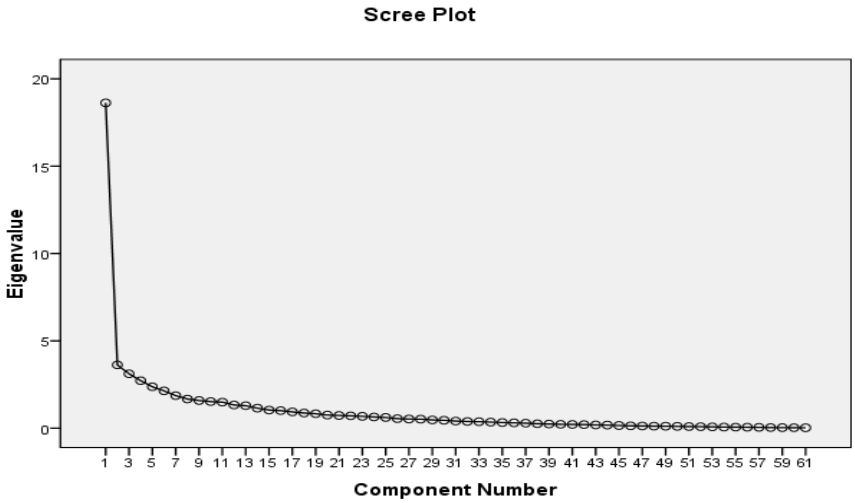


Figure 6.4: Scree plot showing extracted factors on 61 identified barriers to PPP projects

Table 6.10 further indicates the result of a rotated matrix on barriers to PPP projects. The loading of each 61 variable on barriers and other details can be seen in Appendix E for details. As earlier mentioned the value of the MSA as indicated in Table 6.10 is ranging from 0.342-0.822 for barriers (see Table 6.10 for details). This implies that there is no need to eliminate any variable from the analysis. As shown in Table 6.10 principal factor extraction with varimax rotation was carried out on the identified 61 barriers to PPP projects. The rotation matrix converged in 22 iterations. The result of analysis grouped the 61 identified barriers into 10 major interpretable factors with their components (see Table 6.10 for details).

The 10 major factors derived (see Table 6.10 for details) are interpreted as follows:

1. Factor 1: Public and private partners' capacity deficiencies
2. Factor 2: Weak political willingness and administrative bottleneck
3. Factor 3: Weak economic conditions and environmental related problems
4. Factor 4: Social related problems
5. Factor 5: Corruption and inadequate governmental actions in PPPs
6. Factor 6: Low social acceptability
7: Factor 7: Legal and regulatory related problems
8: Factor 8: Poor internal and external stakeholders' relationships
9: Factor 9: Delay and politicisation of the concessions
10: Factor 10: Absence of competition and due diligence (See Section 6.8.2 of Chapter 6 for full discussion of the principal factors)

In the same vein, PCA was conducted on success factors to identify the underlying factors. Table 6.11 indicates both initial eigenvalues and factor loading on success factors (see Appendix F & G for details). Table 6.11 reveals that the first 8 factors/components had eigenvalues greater than 1 (see Appendix F for details), but after using scree plot (see Figure 6.5) and inspecting to find a point at which the shape of the curve changes direction and become horizontal. It is evident that the first 6 factors agreed with scree plot. Given this, the first 6 factors were retained for further investigation after meeting both Kaiser's criterion or eigenvalues and scree plot criteria. Table 6.11 further contains the 6 factors retained for further investigation with their eigenvalues, the percentage of the variance and the cumulative percentage of the variance in each factor, and the factor loading. It can be seen from Table 6.11 that the eigenvalues for the 6 factors retained ranging from 1.309 to 7.521. The total variance explained by the 1st factor was 28.928%, while the 2nd factor explained a total variance of 9.138%. Thus, the total variance explained by these 6 factors extracted is amounted to 60.133% (Table 6.11 for details) and (see Appendix F & G for details).

Table 6.11: Principal factor extraction, varimax rotation and total variance explained on success factors in PPPs

Ref. code	Principal factor	Factor Loading	Initial Eigenvalues		
			Total	% of Total Variance Explained	Cumulative% of Variance Explained
Factor 1: Reliable concession arrangement with due diligence					
F1/SF01	Transparency in the procurement process	0.797	7.521	28.928	28.928
F1/SF20	Effective management control	0.700			
F1/SF03	Good governance	0.685			
F1/SF04	Well organized and committed public agency	0.662			
F1/SF02	Competitive procurement process	0.611			
F1/SF07	Thorough and realistic assessment of the cost and benefits	0.588			
F1/SF22	Appropriate project identification	0.496			
F1/SF25	Favourable investment environment	0.341			
Factor 2: Serious commitment with adequate technical strength					
F2/SF26	Good partners' relationship	0.727	2.376	9.138	38.066
F2/SF11	Commitment and responsibility of public and private sectors	0.696			
F2/SF05	Social support	0.628			
F2/SF10	Appropriate risk allocation and risk sharing	0.594			
F2/SF19	Technical innovation and technology transfer	0.489			
Factor 3: Favourable economic environment					
F3/SF18	Availability of suitable and adequate financial market	0.766	1.635	6.287	44.353
F3/SF16	Stable macroeconomic conditions	0.705			
F3/SF17	Sound economic policy	0.634			
Factor 4: Government support with enabling legislation					
F4/SF14	Multi – benefits objectives	0.667	1.408	5.417	49.770
F4/SF13	Government involvement by providing a guarantee	0.635			
F4/SF08	Favourable legal framework	0.533			
F4/SF09	Project technical feasibility	0.484			
Factor 5: Bankable project with adequate stakeholders involvement					
F5/SF24	Project economic viability	0.787	1.385	5.328	55.098
F5/SF23	Clear project brief and client requirements	0.653			
F5/SF21	Consultation with end-users	0.527			
Factor 6: Strong "political will" with committed private partners					
F6/SF15	Political support	0.758	1.309	5.035	60.133
F6/SF12	Strong and good private consortium	0.582			
F6/SF06	Shared authority between public and private sectors	0.491			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 12 iterations

(See Section 6.8.3 of Chapter 6 for full discussion of the principal factors).

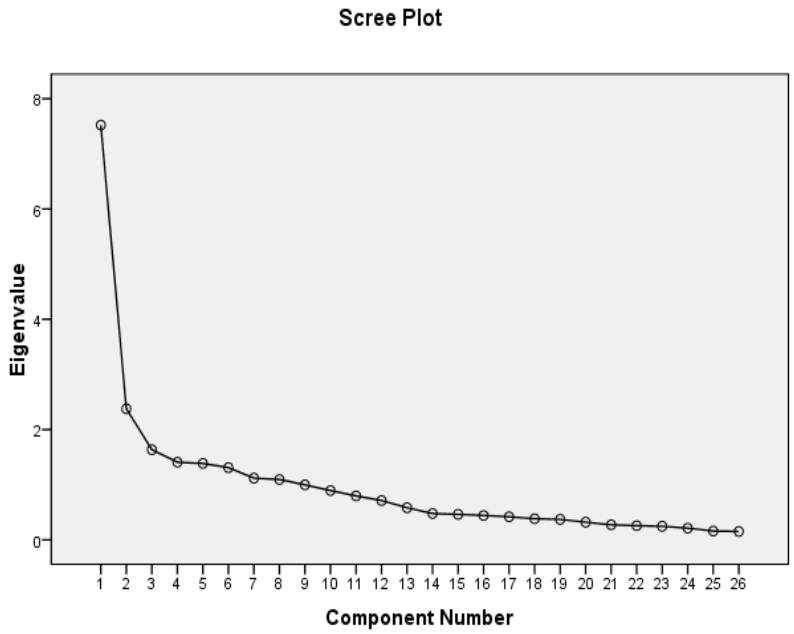


Figure 6.5: Scree plot showing extracted factors on 26 identified success factors to PPP projects

Table 6.11 further indicates the result of the rotated matrix on success factors. It reveals the loading of each 26 variable on success factors. Principal components analysis (PCA) is used to identify underlying factors. As shown in Table 6.11, principal factor extraction with varimax rotation is carried out on the 26 identified success factors, the rotation matrix converged in 12 iterations. The result of analysis grouped the 26 identified success factors into 6 principal factors with their components (see Table 6.11). Thus, the 6 principal factors derived are interpreted as follows:

1. Factor 1: Reliable concession arrangement with due diligence,
2. Factor 2: Serious commitment with adequate technical strength,
3. Factor 3: Favourable economic environment,
4. Factor 4: Government support with enabling legislation,
5. Factor 5: Bankable project with adequate stakeholders involvement, and
6. Factor 6: Strong "political will" with committed private partners (See Section 6.8.3 of Chapter 6 for full discussion)

6.8 Discussion of factor analysis results

6.8.1 Drivers for adopting PPPs

The 5 principal factors extracted from identified 17 drivers for adopting PPPs (see Table 6.9 for details) are explained as follows:

6.8.1.1 Factor 1: Innovation and efficiency gains

This factor accounts for 28.14% (see Table 6.9) of the total variance of drivers for adopting PPPs for infrastructure projects. The main components of innovation and efficiency gains as a factor include: accelerate infrastructure provision; invoking private sector skills, experience, access to technology, and innovation; invoking discipline-private sector has more discipline for translating strategic intent to actions; resolve problems of inefficiencies in traditional procurement; better risk allocation/sharing among others (see Table 6.9 for details). These five components have a factor loading: 0.795; 0.740; 0.598; 0.587 and 0.537 respectively. This finding is similar to previous studies. For instance, AfDB (2010) reports that infrastructure challenges are resolved by taking advantages of private sector strengths such as management efficiency, new technologies, workplace efficiencies, cash flow management among others.

6.8.1.2 Factor 2: Strengthening public infrastructure

This factor amounts to 9.77% (see Table 6.9) of the total variance of drivers. The factor has three main components; this includes: better value for money; faster implementation; and improved quality of service (see Table 6.9 for details). These three components have a factor loading: 0.814; 0.747; and 0.699 respectively. This finding affirmed the assertion of previous researchers that value for money is a principal justification for PPPs (EU, 2003; Harris, 2003; Li *et al.,* 2005b; HM Treasury, 2006; OECD, 2008b) among others. Further, Akintoye & Liyanage (2011) assert that PPPs are commonly used to accelerate economic growth, development and infrastructure delivery and to achieve quality service delivery and good governance. It can be deduced that the growth of PPPs has in many countries increased the availability of resources and sustainability of public infrastructure facilities and services.

6.8.1.3 Factor 3: Delivering to time and cost

This factor accounts for 8.69% (see Table 6.9) of the total variance of drivers. The factor has four components to include: reduced whole life costs; enhanced public management; better incentives to perform; and generate additional revenues. These four components have a

factor loading: 0.708; 0.699; 0.533; and 0.426 respectively. This finding is similar to previous studies (see PwC, 2005; Deloitte, 2007; Ernst & Young, 2007). Thus, the responsibility of the private sector in design and construction fast track the commencement of infrastructure projects and delivers within the timeframe.

6.8.1.4 Factor 4: Construction and operational performance

This factor accounts for 8.13% (see Table 6.9) of the total variance of drivers. The factor has two principal components. This includes: improve buildability and improve maintainability with a factor loading of 0.720 and 0.637 respectively. This is similar to earlier studies. For instance, Harris (2003) asserts that the expertise and experience of the private sector results not only in reduced costs, shorter delivery times and improvement in the functional design, construction processes but also better facility management and operational processes.

6.8.1.5 Factor 5: Engender accountability in fund utilization

This factor accounts for 1.20% (see Table 6.9) of the total variance of drivers. The factor has two main components. This includes: address short political tenures (government rush); and resolve problems of corruption in public procurement with a factor loading of 0.779 and 0.665 respectively. This finding is similar to previous studies. For instance, AfDB (2010) conclude that PPPs will help resolve problems related to traditional procurement such as inefficiency, unreliability, poor fiscal management, manipulations of the procedure for award and execution of public contracts among others.

6.8.2 **Barriers to PPP projects**

The 10 factors extracted from identified 61 barriers to PPP infrastructure projects (see Table 6.10 for details) are discussed as follows:

6.8.2.1 Factor 1: Public and private partners' capacity deficiencies

This factor accounts for 30.05% (see Table 6.10) of the total variance of barriers to PPP projects. The main components include: unavailability of large construction companies to deliver PPP projects; difficulty in specifying work requirements and the quality of service; lack of innovations in design; lack of experience and expertise in both public sector and private investors; and poor coordination between different public sector departments among others (see Table 6.10 for details). These five components have a factor loading: 0.760; 0.758; 0.723; 0.671 and 0.657 respectively. This finding is similar to earlier studies. For instance, Oladapo (2007) asserts that large firms in the Nigerian construction industry are

dominated by international construction firms, and they accounted for about 5% of the total number of construction firms in the formal sector. This is affirmed by Vetiva (2011) that Julius Berger Nigeria Plc remains the market leader, as it controls a large chunk of public sector construction. Gunnigan & Rajput (2010) identify unavailability of large construction companies to deliver PPP projects as one of the barriers to PPPs implementation in India. Akintoye *et al*. (2003) identify difficulty in specifying work requirements and the quality of service on the part of both public and private sectors in PPP projects. Corbett & Smith (2006) identify lack of innovations in design as a barrier to PPP projects implementation. Li *et al*. (2005b), Zhang (2005b) and Chan *et al*. (2010) identify lack of experience and expertise in both the public and private sectors as barriers to PPPs.

These aforementioned barriers under public and private partners' capacity deficiencies have been a serious concern in PPP infrastructure projects implementation in Nigeria. For instance, the concession of Lagos-Ibadan expressway valued at US$597 Million was revoked. Findings revealed that the officials of the government did not have enough knowledge about PPP project and did not employ the services of experienced legal/transaction consultants or technical advisers. Thus, the designing of the project was left entirely to the concessionaire who drew up an agreement that was completely skewed in its favour (ICIR, 2012). Also, the concession of Murtala Mohammed Airport Terminal 2 (MMA 2) valued at about US$250 million, which was commissioned in April 2007 experienced similar barriers. For example, the concession period has been a dispute between the federal government of Nigeria and the concessionaire. Originally the concession period was 12 years but extended to 36 years (Ahmed, 2011; Lucas, 2011; ICIR, 2012). This occurred due to the inadequate experience of the public (ministries, department, and agencies that regulate PPPs in Nigeria) and private sector, especially concessionaires. As at today, the federal government of Nigeria is contesting the concession period of 36 years in the court of law. It is evident that imbalance in the capacities of the public and private partners affect partnership arrangements. Based on this finding, it is obvious that most developing countries particularly Nigeria strongly depends on mature and emerging economies contracting companies, professionals, expertise among others to successfully implement PPP infrastructure projects.

6.8.2.2 Factor 2: Weak political willingness and administrative bottleneck

This factor accounts for 5.91% (see Table 6.10) of the total variance of barriers to PPPs. The main components are as follows: lack of strong political commitment for PPPs; incapability

of government to manage PPP projects; lack of completion in procurement procedures; problems of administrative procedures and guidelines; and lack of transparency and accountability (see Table 6.10 for details). These components have a loading: 0.690; 0.688; 0.655; 0.381; and 0.357 respectively. This finding is similar to earlier studies. For example, Gidado (2010) identifies lack of strong political commitment for PPPs as one of the barriers affecting PPP projects implementation in Nigeria. Mahalingam (2010) identifies lack of political willingness to develop PPPs as barriers to PPPs implementation among others.

6.8.2.3 Factor 3: Weak economic conditions and environmental related problems

This factor amounts to 5.11% (see Table 6.10) of the total variance of barriers. The main components are: inability of local institutions to provide long-term financing/equity financing; difficulties in securing credit facility from banks; difficulties in obtaining foreign exchange/foreign exchange risk; lack of public sector project development funds to promote PPPs; and perceptions of a country/nation as high risk economy by foreign investors (see Table 6.10 for details). These five components have a loading: 0.788; 0.739; 0.655; 0.652; and 0.606 respectively. This finding is similar to Zhang (2005b) that identifies unfavourable economic and commercial conditions, and lack of mature financing as barriers to PPPs. This finding is in contrast with Corbett & Smith (2006) and Chan *et al.* (2006) that identify high transaction costs and high bidding costs as barriers to PPPs project in mature and emerging economies. Moreover, the aforementioned barriers under weak economic conditions and environmental related problems had also contributed to the failure of the concession of Lagos-Ibadan Expressway valued at US$597 million. For example, there was a difficulty for concessionaire in accessing credit facility from banks locally and internationally. Three years after the concession agreement was signed, the construction has failed to take off, which was eventually revoked (ICIR, 2012). Therefore, it necessary for governments to create stable economic and financial supports to promote PPP projects in developing countries.

6.8.2.4 Factor 4: Social related problems

This factor accounts for 4.45% (see Table 6.10) of the total variance of barriers to PPPs. The major components are as follows: lack of confidence and mistrust in PPPs; fear over the implications of decisions made; public opposition/public resistance; and public resentment due to tariff increases (see Table 6.10 for details). These components have a loading factor: 0.749; 0.743; 0.692; and 0.567 respectively. This finding is similar to earlier studies. For

instance, Mahalingam (2010) identifies distrust between the public and private sectors as a barrier to PPPs. Zhang (2005b) identifies social risk as a barrier. El-Gohary *et al*. (2006) identify public opposition as a barrier. Gunnigan & Rajput (2010) identify social and cultural norms, and behaviours of people within a nation as barriers to PPPs. UNECE (2008) report that public opposition has led to many cancellations, both before and after the concession award of PPP projects. In Nigeria, the identified barriers under social related problems have caused some controversies in PPP projects implementation. For example, the concession of Lekki-Epe Expressway in Lagos valued at about US$450 million - the first toll road PPP in Nigeria signed in April 2006 and reached financial close in November 2008. There was a public opposition towards the concession and residents/community along the area challenged the concessionaire's right to charge tolls on that road project, which was later resolved. Therefore, it becomes necessary for all the stakeholders particularly, primary stakeholders in PPPs implementation in developing countries to identify the public interest goals before embarking on any PPPs project, and establish a mechanism for public participation and information disclosure at very early of PPP process.

6.8.2.5 Factor 5: Corruption and inadequate governmental actions in PPPs

This factor amounts to 3.90% (see Table 6.10) of the total variance of barriers. The main components are: accusations of corruption and corrupt tendencies, lengthy delays in negotiation/ delays due to lengthy bureaucratic procedures, lack of coordination between national and regional governments, political reneging, and distortions of guarantees/incentives by governments (see Table 6.10 for details). These components have a loading: 0.822, 0.680, 0.502, 0.495, and 0.475 respectively. This finding is similar to earlier studies. For example, Chen (2007) identifies insufficient government action in PPPs as a barrier to PPPs projects. Chan *et al*. (2010b) identify lengthy delays in negotiation as one of the barriers to PPP implementation. These aforementioned barriers were influencing the implementation of PPP projects in Nigeria. For instance, the accusations of corruption in Nigeria is not limited to the political class alone but cut across all governmental agencies. This portrays the entire country as a corrupt environment for PPPs, thus discouraging genuine local and foreign investors from participating in the Nigerian PPPs market. Also, the lack of coordination between federal and state governments in PPP projects, particularly during the construction of the concession of Lekki-Epe Expressway in Lagos; it took longer than necessary for the Lagos state government to secure the execution of the federal government support agreement. Therefore, the government in developing countries,

especially Nigeria should create a favourable investment environment to make PPPs attractive to both the local and foreign investors.

6.8.2.6 Factor 6: Low social acceptability

This factor amounts to 3.55% (see Table 6.10) of the total variance of barriers. The major components are: low trust between public and private sector, societal discontent against the private sector, weak institutional capacity and PPPs strategy, and cultural impediments include behaviours of people towards PPPs (see Table 6.10 for details). These components have a loading: 0.741, 0.626, 0.620, and 0.411 respectively. This finding is similar to earlier studies (see Chen, 2007; Mahalingam, 2010; Gunnigan & Rajput, 2010) among others.

6.8.2.7 Factor 7: Legal and regulatory related problems

This factor accounts for 3.06% (see Table 6.10) of the total variance of barriers. The main components are as follows: law and regulation changes, weak judicial framework/weak judiciary for resolving PPP disputes, weak/poor regulatory frameworks and enforcement, non-availability of model concession agreements, and lack of independence of regulatory body (see Table 6.10 for details). These components have a loading 0.766, 0.552, 0.540, 0.451, and 0.447. This finding is similar to previous studies. For instance, Li *et al*. (2005b) identify lack of well-established legal framework as a barrier to PPPs among others. This study, therefore, advocates for a solid legal framework for PPPs in Nigeria, in line with international best practices to specify the 'rules of the game' for the participants and reduce project risk.

6.8.2.8 Factor 8: Poor internal and external stakeholders' relationships

This factor amounts to 2.76% (see Table 6.10) of the total variance of barriers. The components are inadequate consultation by stakeholders to create greater acceptance of PPPs, potential conflicts of interests among the stakeholders, perceived rise in tariffs, and PPP process not clearly defined/lack of clarity (see Table 6.10 for details). These components have a loading: 0.596, 0.488, 0.433, and 0.364 respectively. This finding is similar to earlier studies (see Gibson & Davies, 2008; UNESCAP, 2012) among others.

6.8.2.9 Factor 9: Delay and politicisation of the concessions

This factor accounts for 2.63% (see Table 6.10) of the total variance of barriers. The main components include complex decision making, lengthy delays due to political debate, and political interference in procurement process with a loading of 0.555, 0.526, and 0.502

respectively (see Table 6.10 for details). This finding is similar to previous studies (see Chan *et al.,* 2010b; Gidado, 2010) among others.

6.8.2.10 Factor 10: Absence of competition and due diligence

This factor accounts for 2.52% (see Table 6.10) of the total variance of barriers. The factor has two components. These include: non-competitive bidding and poor evaluation; and monitoring and due diligence by the public sector with a loading of 0.763 and 0.485 respectively. This finding is similar to earlier studies. For instance, Abdul-Aziz (2001) identifies the absence of competition as one of the barriers responsible for the failure of Malaysia's privatised national sewerage project. KPMG (2010) identifies lack of competition as a barrier to PPPs in Australia among others.

6.8.3 **Success factors (SFs) for PPP projects**

The 6 principal factors extracted from identified 26 success factors for PPP projects are discussed as follows:

6.8.3.1 Factor 1: Reliable concession arrangement with due diligence

This factor accounts for 28.9% of the total variance between success factors (see Table 6.11). A reliable concession arrangement with due diligence must demonstrate transparency in the procurement, effective management control, and good governance by all stakeholders involved throughout PPP process. These three components have a high factor loading: 0.797; 0.700; and 0.685 respectively. The other three-factor loading components are well organized and committed public agency, competitive procurement process, and thorough and realistic assessment of the cost and benefits with factor loading: 0.662, 0.611, and 0.588 respectively. The last two components include appropriate project identification and favourable investment environment with factor loading: 0.496 and 0.341 respectively. The two components are critical with a view to identifying suitable projects for PPPs because PPPs do not suit every type of infrastructure project. Also, favourable investment environment would induce confidence in both local and foreign investors to participate in PPPs market.

6.8.3.2 Factor 2: Serious commitment with adequate technical strength

This principal factor accounts for 9.1% of the total variance between SFs (see Table 6.11). A serious commitment to adequate technical strength is crucial to smooth development of PPPs. In achieving these, there must be good partners' relationship, commitment and

responsibility of public and private sectors, and social support. These three components have a factor loading: 0.727; 0.696; and 0.628 respectively. The other two components include appropriate risk allocation and risk sharing, and technical innovation and technology transfer with loading factor: 0.594 and 0.489 respectively. PPPs involved various stakeholders with different interests. Thus, the attitude of each stakeholder has an influence on PPP outputs. It is on this note that serious commitment of all stakeholders should be sought. Also, the appropriate risk management framework should be established to allocate risk between public and private sectors because PPPs require effective management of risks. Moreover, PPPs need private sector expertise, technology, and innovations to translate strategic intent into actions.

6.8.3.3 Factor 3: Favourable economic environment

The favourable economic environment is very significant for PPP project development both in developed and developing countries. This factor amounted to 6.3% (see Table 6.11) of the total variance between the SFs. The components include availability of suitable and adequate financial market, stable macroeconomic conditions, and sound economic policy. These three components have a factor loading: 0.766; 0.705; and 0.634 respectively. The willingness of private investors to participate in PPP projects depends greatly on the environment in which these projects are operated. Therefore, the host government should create a favourable environment with stable economic and financial conditions among others to promote successful implementation of PPP projects.

6.8.3.4 Factor 4: Government support with enabling legislation

This factor accounts for 5.4% (see Table 6.11) of the total variance between SFs. The components include multi – benefits objectives, government involvement by providing a guarantee, favourable legal framework, and project technical feasibility. These four components have a loading factor: 0.667; 0.635; 0.533; and 0.484 respectively. Government support in the form of guarantee is imperative in PPP to trigger the private sector confidence. Governments should learn as PPP programmes develop and make adjustments as necessary. Also, a solid legal framework is required for PPPs. Similarly, PPPs have more chances of success when a detailed feasibility study has been undertaken. Therefore, a detailed feasibility study should be carried out by both public and private sector experts to ascertain the work requirements of the project to reduce variation orders to the barest minimum.

6.8.3.5 Factor 5: Bankable project with adequate stakeholders' involvement

This factor accounts for 5.3% (see Table 6.11) of the total variance between SFs. The components include project economic viability, clear project brief and client requirements, and consultation with end-users. These three components have a loading: 0.787; 0.653; and 0.527 respectively. It is evident that PPPs require strong public sector capabilities to determine the economic viability of the project at the very early stage because not every infrastructure projects are suitable for PPPs. Also, both primary and secondary stakeholders must be engaged and informed at very early stage of PPP process.

6.8.3.6 Factor 6: Strong "political will" with committed private partners

This factor accounts for 5.0% (see Table 6.11) of the total variance between SFs. The components include: political support, strong and good private consortium, and shared authority between public and private sectors. These three components have a loading factor: 0.758; 0.582; and 0.491 respectively. This finding is similar to previous studies (see Jefferies *et al*. 2002; Zhang *et al*. 2002; Li *et al*. 2005c; Dulaimi *et al*. 2010; Cheung *et al*. 2012a) among other. Therefore, strong political support is needed to increase developmental assistance, capacity building among others for the successful implementation of PPPs, particularly in developing countries. The private consortium must have financial capabilities, skilled and experienced personnel to develop, manage, execute, and operate the project. Similarly, both public and private sectors should respect opinions of each other throughout PPP process.

6.9 Success factors master-list

In achieving the overall aim of this study, the identified success factors for PPP projects are therefore retained for further investigation. As previously discussed, the result of factor analysis classified the 26 identified success factors into 6 principal factors with their components (sub-success factors) as presented in Table 6.12 on the next page.

Table 6.12: Master-list of success factors for PPP projects

Principal factors	Sub-success factors with their reference code
Factor 1: Reliable concession arrangement with due diligence	F1/SF01:Transparency in the procurement process F1/SF20: Effective management control F1/SF03: Good governance F1/SF04: Well organized and committed public agency F1/SF02: Competitive procurement process F1/SF07: Thorough and realistic assessment of the cost and benefits F1/SF22: Appropriate project identification F1/SF25: Favourable investment environment
Factor 2: Serious commitment with adequate technical strength	F2/SF26: Good partners' relationship F2/SF11: Commitment and responsibility of public and private sectors F2/SF05: Social support F2/SF10: Appropriate risk allocation and risk sharing F2/SF19: Technical innovation and technology transfer
Factor 3: Favourable economic environment	F3/SF18: Availability of suitable and adequate financial market F3/SF16: Stable macroeconomic conditions F3/SF17: Sound economic policy
Factor 4: Government support with enabling legislation	F4/SF14: Multi – benefits objectives F4/SF13: Government involvement by providing a guarantee F4/SF08: Favourable legal framework F4/SF09: Project technical feasibility
Factor 5: Bankable project with adequate stakeholders involvement	F5/SF24: Project economic viability F5/SF23: Clear project brief and client requirements F5/SF21: Consultation with end-users
Factor 6: Strong "political will" with committed private partners	F6/SF15: Political support F6/SF12: Strong and good private consortium F6/SF06: Shared authority between public and private sectors

Table 6.12 provides a total list of 26 identified success factors typical of any successful PPP project. These identified success factors in this study are higher compared to Li (2003) and Cheung (2009) that identify 18 success factors for PPP projects in the UK and China respectively. Therefore, this study employed the 26 identified success factors (see Table 6.12 for details) for further investigation with a view to assessing their criticality in PPP

project case studies. The identified 26 success factors as shown in Table 6.12 are further classified based on their characteristics into PESTLE (Political; Economic; Social; Technological; Legal; and Environmental). The rationale for classifying these success factors into PESTLE was that it is a strategic management tool that describes the macro-economic factors used in the environmental scanning. This is supported by Buchanan & Gibb (1998) that the usefulness of PESTLE lies on the assumption that the success of a particular organisation or management solution cannot be understood without having the information relevant to the specific business environment. Ward & Rivani (2005) assert that PESTLE assumes that specific external and indirect circumstances that characterise the business environment can influence the organisational capacity to produce value. Thus, the choice of PESTLE in this study was informed that success factors for PPP projects are influenced either positively or negatively by PESTLE. Therefore, the identified 26 success factors are classified based on PESTLE factors influencing each of the success factor and stakeholders managing the particular success factor are presented in Table 6.13 as follows:

Table 6.13: PESTLE classification of success factors master-list and stakeholders managing each of the success factors

PESTLE classification & Ref. code	Identified success factors	Govt. & public sector authorities	Private consortium (including concessionaire, local lenders/banks, consultant & contractors
PO/F4/SF13	Government involvement by providing guarantee	✓	
PO/F6/SF15	Political support	✓	
PO/F1/SF03	Good governance	✓	✓
PO/F1/SF02	Competitive procurement process	✓	✓
PO/F1/SF01	Transparency in the procurement process	✓	✓
EC/F3/SF18	Availability of suitable and adequate financial market	✓	✓
EC/F1/SF25	Favourable investment environment	✓	✓
EC/F5/SF24	Project economic viability	✓	✓
EC/F3/SF16	Stable macroeconomic conditions	✓	
EC/F3/SF17	Sound economic policy	✓	
SO/F2/SF11	Commitment and responsibility of public and private sectors	✓	✓
SO/F2/SF26	Good partners' relationship	✓	✓
SO/F5/SF21	Consultation with end-users	✓	✓
SO/F2/SF05	Social support	✓	✓
SO/F6/SF06	Shared authority between public and private sectors	✓	✓
TE/F2/SF10	Appropriate risk allocation and risk sharing	✓	✓
TE/F1/SF03	Effective management control	✓	✓
TE/F4/SF09	Project technical feasibility	✓	✓

PESTLE classification & Ref. code	Identified success factors	Govt. & public sector authorities	Private consortium (including concessionaire, local lenders/banks, consultant & contractors
TE/F5/SF23	Clear project brief and client requirements	✓	
TE/F1/SF22	Appropriate project identification	✓	
TE/F2/SF19	Technical innovation and technology transfer		✓
TE/F1/SF07	Thorough and realistic assessment of the cost and benefits	✓	✓
TE/F6/SF12	Strong and good private consortium		✓
LE/F4/SF08	Favourable legal framework	✓	
EN/F1/SF04	Well organized and committed public agency	✓	
EN/F4/SF14	Multi-benefits objectives	✓	✓

(**Note:** PESTLE classification of success factors and stakeholders managing each of the success factors are of the author's view).

The reference codes as shown in Table 6.13 are interpreted as follows:

F1-F6: representing the 6 major factors extracted through factor analysis on the identified 26 success factors.

SF01-SF26: representing the identity (ID)/serial number of each success factor (SF) ranging from 01-26 (i.e. 26 identified success factors)

PO: means political factor (this implies that all the SFs under PO may be influenced by political factor)

EC: means economic factor (this implies that all the SFs under EC may be influenced by economic factor)

SO: means social factor (this implies that all the SFs under SO may be influenced by social factor)

TE: means technological factor (this implies that all the SFs under TE may be influenced by technological factor)

LE: means legal factor (this implies that all the SFs under LE may be influenced by legal factor)

EN: means environmental factor (this implies that all the SFs under EN may be influenced by environmental factor).

Table 6.13 further indicates the stakeholders managing a particular success factors in PPP life cycle process (i.e. development phase to transfer phase) and factors (PESTLE) that could pose a threat or opportunity to these identified success factors in PPP infrastructure projects implementation. Thus, the success of any PPP project is largely dependent on the ability of these stakeholders to successfully manage these success factors from the

development phase to transfer phase. Therefore, Table 6.13 could be used as an assessment tool to evaluate the performance and current capability maturity levels of stakeholder organisations involved in PPP projects implementation. It is on this premise that Table 6.13, which is success factors master-list, was used to design a case study protocol using Failure Mode and Effect Analysis (FMEA) method (see Appendix H for details). Failure Mode and Effect Analysis (FMEA) as earlier discussed (see methodology chapter for details) was conducted on each 26 identified success factor in the six PPP project case studies to assess their criticality and determine the critical success factors (CSFs) that made PPP infrastructure projects attained different degrees of success in Nigeria. Given this, next chapter that is case study analysis becomes imperative.

6.10 Chapter summary

This chapter presents the results of analysis and discussion of findings from a quantitative strand of the study. The presentation was geared towards the research objectives and the structure of the questionnaire used in obtaining the data. The first section of this chapter presents the findings from the respondents demographic/background information. It revealed that the respondents have vast experience and knowledge of PPPs and that the respondents possessed the adequate experience to supply reliable data for this study. This chapter further addressed research objectives 3&4 comprised the drivers for adopting PPPs, barriers to PPP projects implementation, and success factors applicable for PPP projects. In achieving the overall aim of this study, success factors master-list consisting 26 identified success factors was generated and classified based on factor analysis into 6 principal factors with their components. These success factors in the master-list were further classified based on their characteristics into PESTLE (Political; Economic; Social; Technological; Legal; and Environmental). The classification of 26 identified success factors was taking a step further to the case study with a view to assessing their criticality in the six PPP case studies. Thus, the case study analysis is presented on the next chapter.

Chapter 7: CASE STUDIES: DATA ANALYSIS, PRESENTATION AND DISCUSSION

7.1 Introduction

This chapter presents the analysis and discussion of the findings obtained from the qualitative strand of the study, which is the case study comprising physical and social infrastructure PPP projects in the study area. The chapter summarises the results obtained from the six PPP case studies to include the critical success factors (CSFs) that made each case study attained a different level of success among others.

7.2 Analysis and discussion of qualitative strand of the study

This involves the analysis of data collected from the six case studies. The selected six PPP infrastructure projects were grouped into two sets. The first set is termed 'physical infrastructure or civil and engineering' PPP projects (i.e. case study 1-3). This includes the concession of Lekki-Epe Expressway (road); the concession of Muritala Mohammed Airport (MMA2); and the concession of seaports. The second set is tagged 'building works or social infrastructure' PPP projects (i.e. case study 4-6). These include the development of university hostel (Emerald Hostel at the University of Lagos); Kanti towers modern office complex; and the development of Tejuosho ultra-modern shopping complex. Data were collected using structured interviews, personal observations and a review of documentary evidence relating to the selected case studies. Thus, the presentations of the findings were structured by the replication approach involved in the multiple-case study as illustrated in Figure 5.6 (see methodology chapter). Before the presentation and discussion of findings, it is important to describe the approach adopted in the collection and analysis of data under the qualitative strand of the study.

7.2.1 Qualitative data collection

As discussed earlier, qualitative data were collected from six PPP case studies within Lagos metropolis, Nigeria using structured interviews; personal observation; and review of documentary evidence. The structured interviews were designed to tap lived experience and interviewees were selected from the top management of different key stakeholders in both public and private sectors in each case study. Thus, face-to-face structured interviews were conducted with key stakeholders in each case study comprised three from the public sector authorities (i.e. ministries, department and agencies) and three from the private sector to include consultants, concessionaires, local lenders/banks, and contractors. Each structured

interview lasted between 45 minutes and 60 minutes. The structured interviews were conducted during the second half of 2014 and the first quarter of 2015. The structured interviews were staggered to two case studies per month. The spacing of structured interviews enhanced the establishment of good contact and firm arrangement in term of the date and venue for the interviews. The structured interviews were recorded and pictures were taken on site to document some salient information on the state of the PPP project case studies that were examined. During the interviews, the interviewees were interrogated on each twenty-six identified success factors using FMEA Technique (see Methodology Chapter) with the interviewer completing the scoring to determine the criticality of identified success factors in each case study. Similarly, personal observation and review of documentary evidence were also carried out in each case study.

7.2.2 **Qualitative data analysis**

The case studies data were analysed using thematic/content analysis technique. The case studies were analysed both individually and collectively. Also, Failure Mode and Effect Analysis (FMEA) were used in calculating the RPN values for success factors in the six case studies. In this study context, the success factors that have higher RPN values are regarded as critical (see Figure 5.7 in Chapter 5 for details). Thus, RPN value was used to determine the critical success factors (CSFs) for each case study (see Section 5.14 in Chapter 5 for details). The structures of the presentation of the six case studies were grouped into two sets as earlier mentioned (see Figure 1.1 in Chapter 1 and Figure 5.6 in Chapter 5 for details). The two sets are: (1) physical infrastructure PPP projects; and (2) social infrastructure PPP projects. In each set the presentation involves three main steps: (i) a brief write up on the general background information on each case study, (ii) a write up of the findings, based on FMEA result from the individual case analysis, and (iii) writing a cross case analysis.

7.3 Physical infrastructure PPP projects

There are three PPP project case studies under physical infrastructure. This includes case study 1-3; as a first part of the analysis of the qualitative strand of the study. Brief descriptions of the selected three case studies PPP projects under physical infrastructure are presented in this section. Thus, specific project information to include year of award, concession period, construction period, estimated construction cost, year of commissioning, and stakeholders involved in the concession contract among others were identified in each

PPP case study. This served as baseline data from which the finding in each case study can be compared.

7.3.1 **Case study 1: The concession of Lekki-Epe Expressway**

The United Nation forecasts a population of 20 million in 2020 for the Lagos state, Nigeria Given the population of the state, it is estimated that approximately one million motor vehicles are stationed in Lagos today with a daily traffic flow between the Lagos Mainland and the Lagos Island. Thus, the poor condition of the roads in Lagos characterised by crumbling sidewalks, badly pot-holed road surfaces, non-functional traffic lights, poor signage, and blocked or non-existent drainage systems led to traffic congestion and high journey times, high fuel consumption, and low productivity. This triggered the Lagos state government to start addressing its infrastructure deficit through PPPs. It is against this backdrop that the Lagos state government promulgated the Lagos state roads, bridges and highway infrastructure development board law in 2004. The law provides an enabling PPP legislation to date in Lagos, Nigeria (GLG, 2007). The concession of Lekki-Epe Expressway was the first toll road PPP in Nigeria signed in April 2006 with a view to eliminating the severe traffic gridlock in Lagos Island. The concession consists of two phases: Phase I- involves upgrading and expansion of 49.5km and Phase II of the project involve the construction of approximately 20 km of the Coastal Road on the Lekki Peninsular.

The Lekki-Epe road concession is a 30-year concession agreement between the Lagos state government, Asset Resources Management (ARM Group) as 'key investor', and Lekki Concession Company (LCC) as Special Purpose Vehicle (SPV). The other key stakeholders include Hitech Construction Company Ltd (contractor), High-Point Rendell (advisor), Toll Infrastructure Services Ltd, Aurecon (consultant), Aluko & Oyebode, and Trinity International LLP (legal and regulatory advisers), local and international financiers. The PPP model adopted is Design, Finance, Construct, Operate, Maintain and Transfer a variant of Build Operate and Transfer (BOT). The project was funded, using a mix of debt and equity with some support from the Lagos state government as follows:

- Lagos State Government - The state invested US$42 million in a 20-year mezzanine tranche;

- The African Development Bank - Provided US$85 million senior debt over 15 years;

- Local bank lenders - Provided a 12-year note facility of US$80 million. The banks are: First Bank of Nigeria Plc; United Bank for Africa Plc; Zenith Bank Plc; Diamond Bank Plc; and Fidelity Bank Plc; and
- The remaining term funding was provided by Standard Bank London, which became the sole arranger of the US$93 million 15-year international tranche - underwritten by Standard Bank London and Stanbic IBTC Bank Plc.

Other sources of funding include federal government loans/grants, and private sector finance. The major shareholders in the project include Macquarie Bank and Old Mutual of South Africa through the African Infrastructure Investment Fund. The project was able to raise the first ever 15-year tenured local-currency debt financing in Nigeria from Standard Bank. Also, the support from the Lagos state government has been received in the form of a mezzanine loan (see Figure 7.1 for details). The financial close of the first phase was achieved in November 2008.

Figure 7.1: Financial structure of the concession of Lekki-Epe Expressway at financial close (Source: Lekki Concession Company, 2008, p. 21)

Figure 7.2: Showing a section of Lekki-Epe Expressway after completion

Figure 7.3: Front view of Lekki-Epe Expressway showing tolls charging

The LCC as Special Purpose Vehicle (SPV) invested about US$450 million; this includes about US$42 million mezzanine loans from Lagos state government. The concession project is a user-based toll road with the private party taking on full market risk. Financing will be recovered through charging tolls, advertising fees, duct leases and other defined revenue sources till November 2038 when the concession agreement expires. It is estimated that 85,000 vehicles would use the road each day at the rate of US$1- US$2 toll charges depending on the types of vehicles.

Table 7.1: Summary of the case study 1(Derived from documentary/archival data)

1. Project data	Descriptions
Project name	Lekki-Epe Expressway
Total length in kilometre (Km)	Phase I- 49.5km & Phase II-20 km
PPP model	BOT
Year of award	24 April 2006
Concession period (Years)	30 years
Estimated project cost (US$ million)	US$450 million
Year of commissioning	July 2010 (Phase I)
Status of project	Operational
Operational start	December 2010
Method of payment	Toll-user-based
2. Category of stakeholder involved	
Public sector authorities	i. Lagos State Public Private Partnership Office ii. Ministry of Transportation
Concessionaire	i. Asset Resources Management (ARM Group) ii. Lekki Concession Company (LCC) as Special Purpose Vehicle (SPV)
Financials/Banks	i. African Development Bank ii. Standard Bank London iii. Stanbic IBTC Bank Plc iv. First Bank of Nigeria Plc v. United Bank for Africa Plc vi. Zenith Bank Plc vii. Diamond Bank Plc; and viii. Fidelity Bank Plc
Consultants	i. Aurecon ii. High-Point Rendell iii. Trinity International LLP iv. Aluko & Oyebode
Contractors	**Main contractor** i. Hitech Construction Company Ltd **Sub-contractor** ii. Toll Infrastructure Services Ltd

The lessons learned to date include:

- The importance of stakeholder consultation in the early phase of the project as during the construction phase, communities living along the Lekki-Epe axis began to protest about having to pay tolls and, as a result, tolling was suspended, which was eventually resolved in the court of law.
- The needs for a strong contract management function within the government team, as project preparation not thorough on the side of Lagos state government.

- The importance of managing public and investor perceptions during project implementation, as the project has been delayed resulting in commuter frustration with the perceived lack of progress.
- The need for agreed performance standards that are backed by an effective penalty regime.
- The need for Lagos state government to have its own financial model to ensure that the project was affordable and provided value-for-money and as a bid evaluation tool.
- The need for Lagos state government to have a transaction advisory team.

7.3.2 **Case study 2: The concession of Murtala Mohammed Airport (MMA2)**

In 2003, the federal government chose to rebuild the old domestic airport terminal, that gutted by fire in 2000, through the PPP initiative. The contract was awarded to Bi-Courtney Limited-the parent company of Bi-Courtney Aviation Services Limited, an indigenous company as a concessionaire on a build, operate and transfer (BOT) basis. The BOT contract agreement was originally signed in April 2003 between the federal government and the concessionaire. The contract comprised an airport terminal building, a multi-storey car park, an apron and other ancillary facilities on a land area of 20,000m^2. In June 2004, a supplementary agreement was signed, in which the construction period was extended from 18 to 33months. Similarly, in February 2007 an addendum agreement was signed. Thus, the concession period was extended from 12 to 36 years. The concessionaire invested about US$250 million in the construction of MMA2 and most of the funding comes from a consortium of six local banks (see Table 7.2 for details).

Table 7.2: Summary of the case study 2 (Derived from documentary/archival data)

1. Project data	Descriptions
Project name	Murtala Mohammed Airport (MMA2)
PPP model	BOT
Year of award	April 2003
Planned construction period (Months)	33 Months
Concession period (Years)	36 Years
Estimated project cost (US$ million)	US$250 million
Year of commissioning	7 April 2007
Status of project	Operational
Operational start	7 May 2007
Method of payment	User based
2. Category of stakeholder involved	
Public sector authorities	i. Federal Airports Authority of Nigeria (FAAN) ii. Ministry of Aviation iii. Infrastructure Concession Regulatory Commission (ICRC)
Concessionaire	Bi-Courtney Limited
Financials/Banks	i. Zenith Bank Plc ii. Guaranty Trust Bank (GTB) Plc. iii. First City Monument Bank Plc iv. Access Bank Plc v. First Bank Plc
Consultants	i. Spring Engineering Limited (project manager) ii. AOC Architect (consultant architect) iii. BEE QUE (consultant quantity surveyor)
Contractors	Stabilini Visinioni (main contractor)

The project encountered few challenges. These include: (i) after being awarded the contract; the concessionaire faced significant challenges in securing financing and had to start construction without a long-term financing agreement in place. It was in March 2007 that the concessionaire secured a US$150 million part-financing from a consortium of six banks for the completion of MMA2; (ii) on the operations side, some airlines were reluctant to move from the International Terminal; and (iii) there have been disputes between the parties and claims of breach of contractual rights. For example:

> *"Claims: As at June 2010, FAAN claims that concessionaire owes the government US$6.7 million (mainly 5% of annual turnover), and concessionaire also claims that FAAN owing them US$73 million (mostly proceeds from the operations at the General Aviation Terminal in Lagos)"* (Ahmed, 2011).

The construction work on MMA 2 was completed and commissioned on 7 April 2007 and flight operations commenced on 7 May 2007. Presently, MMA2 is the first BOT project of its magnitude in the area of infrastructure development that was completed by a Nigerian

company. After the completion of MMA2, there has been a substantial improvement and increase in the number of passengers, aircraft movement among others. For example, existing survey indicates that after the commissioning of MMA2 in 2007, the total passengers started increasing by almost a million in every year and a significant rise in total aircraft movements as at today.

Figure 7.4: Showing reception of MMA2 after completion

Figure 7.5: Showing external view of MMA2 after completion

The main lessons learned include:

- The importance of having an agreed financial model and long-term financing in place at the outset of the project.
- The initial bidding process also points to the importance of managing politicians' expectations and setting realistic goals regarding timelines.
- The difficulties in enforcing contractual agreements.
- Any conflict of interest faced by the government puts significant pressures on the ability of the private sponsor to recover its investments and thus placed the financial viability of the project at risk.

7.3.3 **Case study 3: The concession of Seaport Terminals**

Since the inception of seaports in Nigeria by the colonial masters in 1921, no systematic process for their re-development had been put in place until the present concession programme of port reforms started in 2000. The concession brought into existence the current set of private port operators in Nigeria. The concession of Nigerian ports gained global credibility with the involvement of the World Bank, CPCS Transcom (of Canada) and Royal Haskoning (of Holland) as project monitors, concession bid managers and consultants respectively (Fivestar Logistics, 2008).

Table 7.3: Summary of the case study 3 (Derived from documentary/archival data)

1. Project data	**Descriptions**
Project name	Seaport terminals
PPP model	Landlord port model & ROT
Year of award	2004
Concession period (Years)	10-25 years
Estimated project cost (US$ billion)	US$ 1.70 billion
Year of commissioning	2006 (see Table 7.5 for details)
Status of project	Operational
Operational start	(see Table 7.5 for details)
2. Category of stakeholder involved	
Public sector authorities	i. Bureau of Public Enterprise (BPE) ii. Federal Ministry of Transport iii. Nigerian Ports Authority
Concessionaires	26 concessionaires-this includes: i. AP Moller ii. ENL Consortium iii. Ecomarine Nig. Ltd. (see Table 7.5 for full list)
Financials/Banks	World Bank Public Private Infrastructure Advisory Fund & Foreign Direct Investment (FDI)
Consultants	i. CPCS Transcom (of Canada) ii.Royal Haskoning (of Holland) iii. World Bank (project monitors)

In 2001, the Federal Ministry of Transport through the World Bank Public Private Infrastructure Advisory raised funds and commissioned Dutch consultants Royal Haskoning to do a 'Ports Modernisation Project Study'. The Royal Haskoning report on Nigerian seaports reform called 'Haskoning Study' was submitted to the Federal Government and was accepted as a dispassionate x-ray of the Nigerian seaport system (Fivestar Logistics, 2008; Pallis, 2012). Moreover, the Haskoning study's and other existing studies (see Bert, 2008; Fivestar Logistics, 2008) revealed that the Nigerian seaports were bedevilled with difficulties summarised as follows:

- Turn-around time for ships was too long and usually calculated in weeks, sometimes months, depending on the cargo being loaded or discharged.
- Cargo-handling plants and equipment owned by the Nigerian Ports Authority (NPA) were few and mostly unserviceable, leading to shipping companies hiring these machines from private sector sources after having paid NPA.
- The dwell time for goods in ports was prolonged due to poor port management. As a result, over time cargo filled the most active seaports leading to port congestion.
- Many port premises and quay aprons had fallen into disuse and failed road sections inside the ports made the movement of goods within port grounds cumbersome and very slow.
- Following the seaport congestion, complaints of untraceable or missing cargoes were regularly lodged against the NPA, all to no avail.

Following the submission of the Royal Haskoning reports' and extensive consultations with maritime stakeholders, and recommendation of the project monitors (i.e. CPCS and World Bank), a consensus was reached on the strategy for reforming and modernising Nigeria's seaport system (Bert, 2008). It is against this backdrop that "landlord port model" was adopted for Nigeria seaports. The "landlord port model" entails that the public sector handles port planning and regulatory tasks (related to safety, security and environmental) and maintains ownership of port-related land and necessary infrastructure. While the private sector manages marine and terminal operations, construction, cargo handling operations, dock labour management, purchase and ownership of superstructure and equipment (NPA Brand Manual, 2005; Bert, 2008). In view of this, the Bureau of Public Enterprise (BPE) engaged CPCS Transcom to evolve the legal and regulatory framework for the series of transactions, to prepare the restructure and concession plans and to assist in the bidding process. Before the concession in 2006, there are eight major ports in Nigeria, as illustrated in Table 7.4 on the next page.

Table 7.4: Characteristics of major ports before the concession

No.	Port	Location	Maximum depth of berth	Quay length (Metres)
1.	Apapa Port	Lagos	9.0	2459
2.	Tin Can Island Port	Lagos	11.5	2045
3.	RoRo Port	Lagos	11.5	705
4.	Container Terminal	Lagos	10.5	1005
5.	Port Harcourt Port	Port Harcourt	7.8	1877
6.	Delta Ports	Warri	11.5	2506
7.	Calabar Port	Calabar	11.0	1137
8.	Federal Lighter Terminal	Onne	5.7	1185

Source: (NPA Service Charter, 2001)

The concession of the ports was completed in 2006 after an international competitive bidding process (Bert, 2008). This led to the emergence of twenty-six port terminals carved out for competitive bidding in eight ports (see Table 7.4). The twenty-six port terminal concessions are presented in Table 7.5 on the next page.

Table 7.5: Port terminals and their successful bidders

Port Terminal	Company name	Concession period (Year)	Handover date/Commission date
Apapa Terminal A	Apapa Bulk Terminal Ltd.	25	3 April 2006
Apapa Terminal B	Apapa Bulk Terminal Ltd.	25	3 April 2006
Apapa Terminal C	ENL Consortium	10	3 April 2006
Apapa Terminal D	ENL Consortium	10	3 April 2006
Apapa Terminal E	Greenview Dev. Nig. Ltd.	25	3 April 2006
Apapa Container Terminal	APM Terminals Ltd.	25	3 April 2006
Ijora Container Depot	Lilypond Container Depot Nig. Ltd	10	3 April 2006
Tin Can Island Port Terminal A	Josepdam Ports Services Ltd.	10	10 May 2006
Tin Can Island Port Terminal B	Tin Can Island Container Ltd.	15	10 May 2006
Tin Can Island Port Terminal C	Ports & Cargo Handling Serv. Ltd	10	10 May 2006
Tin Can Island Port RoRo Terminal	Five Star Logistics Ltd.	15	10 May 2006
Port Harcourt Terminal A	Ports & Terminal Operators Nig. Ltd.	15	23 June 2006
Port Harcourt Terminal B	BUA Ports & Terminals Ltd.	25	23 June 2006
Onne FOT A	Intels Nigeria Ltd.	25	21 June 2006
Onne FLT A	Brawal Oil Services Ltd.	25	21 June 2006
Onne FLT B	Intels Nigeria Ltd.	25	21 June 2006
Jetty FOT Onne	Atlas Cement Co. Ltd	25	21 June 2006
Calabar New Port Terminal A	Intels Nigeria Ltd.	25	23 June 2006
Calabar New Port Terminal B	Ecomarine Nig. Ltd.	10	1 August 2007
Calabar Terminal C (old port)	Addax Logistics Nig. Ltd.	25	26 May 2007
Warri Old Port Terminal A	Intels Nigeria Ltd.	25	23 June 2006
Warri Old Port Terminal B	Associated Maritime Services Ltd.	10	12 June 2007
Warri New Port Terminal B	Intels Nigeria Ltd.	25	23 June 2006
Warri New Port Terminal C	Julius Berger PLC	25	4 May 2007
Koko Terminal	Greenleigh Limited	10	12 June 2007

Source: (Bert, 2008; Nigerian Ports Authority Brand Manual, 2010)

As shown in Table 7.5, the concessions took effect in 2006 and the port terminals were handed over to their successful bidders, except five (out of twenty-six) port terminals that were handed over in 2007(see Table 7.5). Thus, the concession period for the twenty-six port terminals ranged between 10-25 years, eleven (out of twenty-six) port terminals concessions were located in Lagos.

Figure 7.6: Showing main entrance of Apapa quays in Lagos

Figure 7.7: Showing Roro Port Tin Can Island Apapa Lagos (one of the port terminals) after concession

After the concession in 2006, the Nigerian ports witnessed a rapid transformation (Fivestar Logistics, 2008; Bert, 2008). For example, the total volume of cargo handled at the Nigerian ports from 1980 to 2012 indicated that the pattern in Nigerian ports traffic during the pre-concession era (1980-2005) is sinusoidal, while the post-concession era (2006-2012) experienced a sharp progressive rise as presented in Table 7.6 on the next page.

Table 7.6: Cargo movement at Nigerian ports (pre and post concession)

Year	Inward Cargo	Outward Cargo	Total Cargo
1980	15,600,380	2,356,815	17,957,195
1981	20,728,974	2,913,742	23,642,716
1982	20,073,797	2,537,432	22,611,229
1983	16,394,509	2,346,700	18,741,209
1984	12,372,417	2,278,685	14,651,102
1985	13,453,939	2,947,740	16,401,679
1986	9,851,059	2,423,520	12,274,579
1987	9,288,006	2,249,584	11,537,590
1988	7,773,258	3,402,088	11,175,346
1989	8,759,961	4,616,226	13,376,187
1990	9,338,801	6,830,356	16,169,157
1991	11,021,521	6,819,380	17,840,901
1992	13,414,501	5,487,925	18,902,426
1993	12,897,955	5,739,047	18,637,002
1994	9,579,969	4,281,879	13,861,848
1995	9,289,971	3,983,082	13,273,053
1996	10,224,300	5,251,001	15,475,301
1997	11,213,624	5,369,181	16,582,805
1998	14,286,864	5,038,854	19,325,718
1999	15,751,331	6,481,605	22,232,936
2000	19,230,496	9,702,384	28,932,880
2001	24,668,791	11,271,901	35,940,692
2002	25,206,380	11,780,861	36,987,241
2003	27,839,293	11,926,652	39,765,945
2004	26,907,075	13,909,872	40,816,947
2005	29,254,766	15,697,312	44,952,078
2006	29,089,268	17,061,250	46,150,518
2007	35,544,965	21,928,385	57,473,350
2008	41,195,616	22,787,133	63,982,749
2009	45,757,149	20,018,360	65,775,509
2010	46,928,848	29,815,879	76,744,727
2011	52,010,440	31,439,592	83,450,032
2012	46,234,240	30,870,498	77,104,738

Source: (Nigerian Ports Authority, 2012)

Table 7.6 indicates a fluctuation in cargo movement from 1980 to 2005 while the cargo movement continues to increase unabated from 2006 to 2012. Thus, there was a remarkable rise in the inward and outward cargo movement during the post-concession era compared to the pre-concession era. Also, four years after the concession of Apapa-Lagos container terminal, delays for berthing space has dwindled, shipping lines congestion surcharge was reduced, and savings to government is estimated at US$200 million a year.

The lessons learnt include:

- There is a need to create an independent regulator that can monitor, resolve disputes, regulate pricing and competition, and allowing the NPA to focus on its core obligations as a landlord.
- The importance of establishing a legal and institutional framework for private participation. For instance, the concession contracts between government agencies and private investors must be underpinned by a strong legal framework to ensure transparency and sustainability.
- There is a need for host government agencies to work closely with international institutions and independent advisors to devise the concession model and to outline the concession process. As international technical support is an effective way to ensure that best practices are implemented most especially in developing countries.

7.4 Social infrastructure PPP projects

This is the second set of PPP project case studies called social infrastructure. This includes case study 4-6. Thus, brief descriptions of the selected three case studies PPP projects under social infrastructure are presented in this section. The specific project information to include year of award, concession period, construction period, estimated construction cost, year of commissioning, and stakeholders involved in the concession contract among others were identified in each PPP case study as follows:

7.4.1 Case study 4: The concession of hostel accommodation

The university hostel accommodation for students in Nigeria has been a major concern among the stakeholders in the Nigerian education sector. This occurred as a result of increasing interest in the university education over the years, thus led to an inevitable increase in students' population. The rise in students' population has led to various problematic conditions of students' university hostel accommodation, which range from inadequate infrastructure facilities to overcrowding. For example, about ten students share a space allocated to four students. Also, the problems of unsanitary environment lead to an outbreak of diseases and socio disorder among others. These problems have been a subject of debate among the concerned stakeholders in recent time, with a view to providing a best practicable approach to achieving efficient, conducive, and enabling academic driven environment. It against this backdrop that the University of Lagos, Nigeria embraced PPPs

using build-operate & transfer (BOT) model for the provision of hostel accommodation for their students.

Table 7.7: Summary of the case study 4 (Derived from documentary/archival data)

1. Project data	**Descriptions**
Project name	Emerald Hostel
PPP model	BOT
Year of award	10 February 2006
Initial construction period (Months)	24 Months
Concession period (Years)	21 Years
Year of commissioning	14 November 2007
Status of project	Operational
Operational start	January 2008
Method of payment	Rental model
2. Category of stakeholder involved	
Public sector authorities	University of Lagos- Department of Works and Maintenance
Concessionaire	Gideon Titles Limited
Financials/Banks	Intercontinental Bank Plc
Consultants	Unique Architect (consultant architect)

Before giving the descriptions of case study 4, it becomes necessary to have the overview of hostel accommodation in the University of Lagos briefly. Thus, it is presented as follows:

The University of Lagos is one of Nigeria first generation universities established in 1962 by the federal government of Nigeria. It has two campuses- the main campus is located at Akoka, Yaba, while the Medical Campus of the College of Medicine is located a few kilometres from the main campus at Idi-Araba, all on the Lagos mainland. The university had approximately 45,000 students as of 2010 and remained one of the largest student populations of any university in Nigeria. The university can only accommodate about 12,750 students. The allocation of students to halls of residence is as follows: first-year students, final year students, sportsmen and women, and foreign students. These include virtually all international students who applied for accommodation in the university. Moreover, the University has thirteen students' halls of residence for undergraduate students and two halls of residence for postgraduate students as presented in Table 7.8 on the next page.

Table 7.8: Name of students' halls of residence in University of Lagos

No	Category	Gender	Student level
1.	Erastus Akingbola	Mixed	Postgraduate
2.	Henry Carr	Mixed	Postgraduate
3.	Biobaku Hall	Male	Undergraduate
4.	El Kanemi Hall	Male	Undergraduate
5.	Eni Njoku Hall	Male	Undergraduate
6.	Jaja Hall	Male	Undergraduate
7.	Mariere Hall	Male	Undergraduate
8.	Sodeinde Hall	Male	Undergraduate
9.	Amina Hall	Female	Undergraduate
10.	Fagunwa Hall	Female	Undergraduate
11.	Honours Hall	Female	Undergraduate
12.	Kofoworola Ademola Hall	Female	Undergraduate
13.	Madam Tinubu Hall	Female	Undergraduate
14.	Makama Bida Hall	Female	Undergraduate
15.	Moremi Hall	Female	Undergraduate

Some students (both the undergraduate and postgraduate) also reside in private residences and hostels outside the campus. As a result of inevitable annual increase in student population, there are plans to provide more halls of residence through PPPs at the University of Lagos.

Figure 7.8: Showing front and side view of Emerald Hostel

Figure 7.9: Showing front view of Emerald Hostel

The contract was awarded on 10 February 2006 to Gideon Titles Limited as a concessionaire with a view to reducing the students' accommodation problems, particularly among the female students and providing a conducive environment for learning. The Emerald Hostel concession is a 21-year BOT contract agreement signed between the authorities of University of Lagos (particularly the department of works and maintenance unit- the unit regulating and monitoring all the construction activities) and the concessionaire in 2006. The contract comprises 2-block of 3 storeys building all en-suite with 103 rooms (of size 3m x 4.2m), car park, cafeteria and other ancillary facilities on a total land area of 6,599.795 m^2. The construction of the project was completed on 14 November 2007 and starting operation in January 2008.

7.4.2 **Case study 5: The concession of Kanti towers modern office complex**

In 2010, the Lagos state government chose to increase commercial office spaces in Lagos metropolis through PPPs. The contract was awarded to Messrs Senkay Nigeria Limited as a concessionaire on a build, operate and transfer (BOT) arrangement. The BOT contract agreement was signed in 2010 between the Lagos State Development and Property Corporation (LSDPC) and concessionaire (see Table 7.9 for details).

Table 7.9: Summary of the case study 5 (Derived from documentary/archival data)

1. Project data	Descriptions
Project name	Kanti towers modern office complex
PPP model	BOT
Year of award	2010
Initial construction period (Months)	30 Months
Final construction period (Months)	48 Months
Concession period (Years)	25 Years
Estimated project cost (US$ million)	US$ 32 million
Year of commissioning	August 2014
Status of project	Operational
Operational start	December 2014
Method of payment	Rental model
2. Category of stakeholder involved	
Public sector authorities	i. Lagos State Development and Property Corporation (LSDPC)
Concessionaire	Messrs Senkay Nigeria Limited
Financials/Banks	Skye Bank Plc
Consultants	i. AZDEC ASC Design (architect) ii. Rabiu Mid Associates (quantity surveyors) iii. Leecon Associates (structural engineers) iv. Poolad Consult (services consultant**)**
Contractors	**Main Contractor** – Cappa & D'Alberto **Sub-Contractors** i. **Piling Contractors –** Trevi Foundations ii. **M&E Contractor** – Almog Engineering iii. **Air conditioning and HVAC** – Coolingcare iv. **Cladding, curtain walls and windows** – Alumaco Plc v. **Lifts** – ARG

The project is named 'Kanti Towers' located in Ademola Adetokunbo Street, Victoria Island, Lagos. The project is high rise commercial building comprises 15 storey office complex with 2 basement floors, 5 floors of parking and 10 floors of office space. The building, which stands on pile foundation is 32.23m long x 24.23m wide and 52.00m high overall and has an approximate office area of 6,500m^2 and parking space for approximately 100 cars. Also, the building has external finishes in aluminium cladding and curtain walls, 3 passenger lifts and one god lift including a helipad. The total project cost is estimated at US$ 32 million including land acquisition costs and the estimated construction period is 30 months (2.5 years).

Figure 7.10: Showing the front and side view of Kanti Tower during construction

Figure 7.11: Indicating the front view of Kanti Tower at completion stage

The project is still under construction, precisely is at the 12th floor in 2012 and the earliest delivery date is December 2012. Thus, the project was completed in 2014 against December 2012 that was estimated, resulting the final construction period to about 4 years. The

concession period is 25 years; in which financing will be recovered through the rental model and other defined revenue sources till 2039 when the concession agreement expires.

7.4.3 **Case study 6: The concession of Tejuosho ultra-modern shopping complex**

Since the old Tejuosho market that was one of the biggest markets in Lagos was gutted by fire on 18 December 2007, where shop owners lost millions of naira and properties to the inferno, its new construction began in late 2008 through PPPs. The new market complex is located along the Ojuolegba-Itire road in Yaba, Lagos.

Table 7.10: Summary of the case study 6 (Derived from documentary/archival data)

1. Project data	**Descriptions**
Project name	Tejuosho ultra-modern shopping complex
PPP model	BOT
Year of award	2008
Initial construction period (Months)	18 Months
Final construction period (Months)	48 Months
Concession period (Years)	25 Years
Estimated construction cost (US$ million)	US$46 Million
Final construction cost (US$ million)	US$93 Million
Year of commissioning	15 August 2014
Status of project	Operational
Operational start	27 August 2014
Method of payment	Rental model
2. Category of stakeholder involved	
Public sector authorities	Lagos State Ministry of Physical Planning & Urban Development
Concessionaire	Stomberg Engineering Limited
Financials/Banks	First Bank Nigeria PLC
Consultants	i. Consol Associates (project manager) ii. Agram Nigeria Limited (Architect) iii. Pinconsult Limited (Structural Engineer) iv. QTECH Engineering Limited (M&E Engineer) v. Costec Consultants (quantity surveyor)
Contractors	**Main Contractor**- Ugur Bas (UBA) Construction Ltd **Subcontractors** i. **M&E contractor**- Hoten Engineering Ltd ii. **Structural steel works** - Eldorado Nigeria Ltd iii. **Skylight Roof System**- CSA interiors

In 2008, a 25-year build, operate and transfer (BOT) agreement was signed between the Lagos state government and Stomberg Engineering Limited as a concessionaire. Tejuosho market is located on 3 hectares of land where the old one was and house 4,048 shops with 1700 traditional shops. The main building is a 5-storey building consisting of basement,

ground and 3 upper floors. Other ancillary facilities include police post, sewage treatment plant, a car park that can accommodate 580 cars, service area of banks, restaurants, first aid centres, fire stations and a truck loading and off-loading space. The total gross floor area of main building is 110,000 square metres.

Figure 7.12: Showing left side section during construction

Figure 7.13: Showing part of front view during construction

Figure 7.14: Showing part of front view at completion stage

Figure 7.15: Showing front view and side view after completion

Figure 7.16: Showing directory inside the shopping complex

The ultra-modern Tejuosho shopping complex with over 4,000 shop spaces including lock up and K-Clamp shops is ready for commercial opportunities for savvy investors, businessmen and sundry interests in commerce.

7.5 Discussion of findings on the case studies

Having discussed the background information relevant to the case studies, the next section is the report of the findings from the structured interviews conducted on a case-by-case basis. Thus, to achieve the overall aim of this study, this section presents the results on the criticality of the success factors that made these six PPP case studies attained various degrees of successes. As previously mentioned, face-to-face interviews were conducted with key stakeholders in each case study comprising three from public sector (i.e. ministries, department and agencies) and three from private sector to include: consultants, concessionaires, local lenders/banks, and contractors. Therefore, the background details of interviewees in the six PPP case studies are presented in Table 7.11 as follows:

Table 7.11: Distribution and background information of interviewees from both public and private sector organisations

No.	Organisation of Interviewee	Position of Interviewee	Years of Professional Experience of Interviewee
Case Study 1: Concession of Lekki-Epe Expressway			
1	Public sector: PPP Office- Contract Administration Unit	Team Leader	10 Years
2	Public sector: PPP Office- Legal and Risk Management Unit	Team Leader	12 Years
3	Public sector: PPP Office- Engineering and Construction Unit	Team Leader	9 Years
4	Private sector: Financial(First Bank) Specialised/Project Financing Unit	Manager	16 Years
5	Private sector: Concessionaire (LCC (SPV)- Procurement Unit)	Team Leader	8 Years
6	Private sector: Consultant-Legal advisor	Managing Director	15 Years
Case Study 2: Concession of Muritala Mohammed Airport Terminal 2 (MMA 2)			
7	Private sector: Financial (FCMB) Project Financing Unit	Assistant Manager	11 Years
8	Private sector: Consultant-Project Manager	Managing Director	22 Years
9	Private sector: Consultant- Quantity Surveyor	Managing Director	27 Years
10	Public sector: FAAN- Procurement Unit	Manager	24 Years
11	Public sector: FAAN- Corporate Affairs	Assistant Manager	22 Years
12	Public sector: FAAN- Legal and Risk Unit	Assistant Manager	20 Years
Case Study 3: Concession of Seaport Terminals			
13	Private sector: Project Consultant	Team Leader	12 Years
14	Public sector: NPA- Procurement Unit	Manager	24 Years
15	Public sector: NPA- Engineering Unit	Assistant Manager	21 Years

No.	Organisation of Interviewee	Position of Interviewee	Years of Professional Experience of Interviewee
16	Public sector: NIMASA- Procurement Unit	Manager	25 Years
17	Private sector: Contractor	Managing Director	20 Years
18	Private sector: Concessionaire (ENL Consortium)	Manager	18 Years
Case Study 4: Emerald Hostel University Accommodation			
19	Public sector: Works and Services Department (Unilag)	Senior Architect	10 Years
20	Public sector: Works and Services Department (Unilag)	Assistant Director	20 Years
21	Public sector: Works and Services Department (Unilag)	Senior Quantity Surveyor	12 Years
22	Private sector: Concessionaire	Manager	15 Years
23	Private sector: Legal Adviser	Managing Director	20 Years
24	Private sector: Consultant-Architect	Managing Director	23 Years
Case Study 5: Kanti Tower Modern Office Complex			
25	Public sector: LSDPC- Quantity Surveying Department	Manager	25 Years
26	Public sector: LSDPC- Procurement Unit	Assistant Manager	23 Years
27	Public sector: LSDPC- Civil and Structure Department	Assistant Manager	22 Years
28	Private sector: Concessionaire	Managing Director	25 Years
29	Private sector: Consultant-Quantity Surveyor	Managing Director	26 Years
30	Private sector: Financial(Skye Bank) Project Financing Unit	Manager	15 Years
Case Study 6: Tejuosho Ultra-Modern Market Complex			
31	Private sector: Financial(First Bank) Project Financing Unit	Assistant Manger	11 Years
32	Private sector: Consultant-Quantity Surveyor	Managing Director	28 Years
33	Private sector: Concessionaire	Executive Director	22 Years
34	Public sector: Physical Planning and Urban Development	Assistant Director	23 Years
35	Public sector: Lagos State Physical Development Authority	Assistant Director	21 Years
36	Public sector: Ministry of Works and Infrastructure	Director	23 Years

As shown in Table 7.11, the 36 interviewees (representing 6 interviewees in each case study) were top management from both public and private sectors with their professional years of experience ranging 8 to 28 years (see Table 7.11 for details), and have directly involved in the aforementioned PPP project case studies from conception to completion. The findings from the six PPP infrastructure project case studies using FMEA technique (see Chapter 5 for details) were grouped into two sets as follows:

1. Physical infrastructure/civil and engineering PPP case studies,
2. Social infrastructure/ Building work PPP case studies.

7.5.1 Assessment of criticality of the identified 26 success factors in 'physical infrastructure/civil and engineering' PPP project case studies: using FMEA technique

In this study, the physical infrastructure PPP project case studies investigated include the concession of Lekki-Epe Expressway (road) (case study 1); the concession of Muritala Mohammed Airport (MMA2) (case study 2); and the concession of seaports (case study 3). During the interviews, the interviewees were interrogated on twenty-six identified success factors using Failure Mode Effect Analysis (FMEA) technique (see methodology Chapter). Thus, the results of FMEA in each case study under physical infrastructure (i.e. case study 1-3) were presented in Appendix I-K respectively. Similarly, the full details of assessment of the criticality of identified success factors in the aforementioned three case studies are summarised and presented in Table 7.12 on the next page.

Table 7.12: Summary of the assessment of criticality of success factors using FMEA technique in physical infrastructure PPP project case studies

Success factors including ref. coding	Case study 1				Case study 2				Case study 3			
	Public	Private	Total	Remark	Public	Private	Total	Remark	Public	Private	Total	Remark
Political	RPN	RPN	Av. RPN		RPN	RPN	Av. RPN		RPN	RPN	Av. RPN	
Government involvement by providing guarantees/PO/F4/SF13	810	800	805	Critical	720	810	765	Critical	720	800	760	Critical
Political support/PO/F6/SF15	648	900	774	Critical	720	900	810	Critical	900	720	810	Critical
Good governance/PO/F1/SF03	560	480	520	Somehow Critical	120	252	186	Not Critical	336	432	384	Less Critical
Competitive procurement process/PO/F1/SF02	336	504	420	Less Critical	32	140	86	Not Critical	810	720	765	Critical
Transparency in the procurement process/PO/F1/SF01	240	448	344	Less Critical	08	54	31	Not Critical	800	720	760	Critical
Economic												
Availability of suitable and adequate financial market/EC/F3/SF18	720	810	765	Critical	810	900	855	Critical	441	432	218	Not Critical
Favourable investment environment/EC/F1/SF25	648	720	684	Somehow Critical	729	648	689	Somehow Critical	640	567	604	Somehow Critical
Project economic viability/EC/F5/SF24	720	900	810	Critical	810	720	765	Critical	810	720	765	Critical
Stable macroeconomic conditions/EC/F3/SF16	180	280	230	Not Critical	120	392	256	Less Critical	384	576	480	Less Critical
Sound economic policy/EC/F3/SF17	252	336	294	Less Critical	96	210	153	Not Critical	280	336	308	Less Critical
Social												
Commitment and responsibility of public and private sectors/SO/F2/SF11	392	648	520	Somehow Critical	252	441	231	Not Critical	720	810	765	Critical
Good partners' relationship/SO/F2/SF26	252	504	378	Less Critical	75	210	143	Not Critical	280	294	574	Somehow Critical
Consultation with end-users/SO/F5/SF21	100	126	113	Not Critical	07	64	36	Not Critical	180	140	160	Not Critical
Social support/SO/F2/SF05	180	320	250	Less Critical	150	216	183	Not Critical	336	252	294	Less Critical
Shared authority between public and private sectors/SO/F6/SF06	336	294	315	Less Critical	36	150	93	Not Critical	432	294	363	Less Critical

Note: FMEA- Failure Mode & Effect Analysis; RPN- Risk Priority Number; Criticality Scale: 1-250-Not Critical; 250-500-Less Critical; 500-750-Somehow Critical; 750-1000-Critical

Success factors including ref. coding	Case study 1				Case study 2				Case study 3			
	Public	Private	Total	Remark	Public	Private	Total	Remark	Public	Private	Total	Remark
Technological	RPN	RPN	Av. RPN		RPN	RPN	Av. RPN		RPN	RPN	Av. RPN	
Appropriate risk allocation and risk sharing/TE/F2/SF10	800	810	805	Critical	144	245	195	Not Critical	810	800	805	Critical
Effective management control/TE/F1/SF20	504	720	612	Somehow Critical	96	315	206	Not Critical	504	648	576	Somehow Critical
Project technical feasibility/TE/F4/SF09	720	648	684	Somehow Critical	392	378	385	Less Critical	576	648	612	Somehow Critical
Clear project brief and client requirements/TE/F5/SF23	504	336	420	Less Critical	63	120	92	Not Critical	336	432	384	Less Critical
Appropriate project identification/TE/F1/SF22	800	720	760	Critical	810	720	765	Not Critical	441	504	473	Less Critical
Technical innovation and technology transfer/TE/F2/SF19	720	810	765	Critical	120	280	200	Not Critical	504	648	576	Somehow Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	800	810	805	Critical	294	576	435	Less Critical	567	648	608	Somehow Critical
Strong and good private consortium/TE/F6/SF12	720	800	760	Critical	448	648	548	Somehow Critical	810	800	805	Critical
Legal												
Favourable legal framework/LE/F4/SF08	648	900	774	Critical	60	168	114	Not Critical	630	640	635	Somehow Critical
Environmental												
Well organised and committed public agency/EN/F1/SF04	240	224	232	Less Critical	294	210	252	Less Critical	384	336	360	Less Critical
Multi-benefits objectives/EN/F4/SF14	180	392	286	Less Critical	144	336	240	Not Critical	252	210	231	Not Critical

Note: FMEA- Failure Mode & Effect Analysis; RPN- Risk Priority Number; Criticality Scale: 1-250-Not Critical; 250-500-Less Critical; 500-750-Somehow Critical; 750-1000-Critical

Table 7.12 reveals that government involvement by providing guarantees, political support, availability of suitable and adequate financial market, project economic viability, appropriate risk allocation and risk sharing, appropriate project identification, thorough and realistic assessment of the cost and benefits, strong and good private consortium, technical innovation and technology transfer, and favourable legal framework were 10 critical success factors (CSFs) that made the concession of Lekki-Epe Expressway (i.e. case study 1) attained the level of success it was achieved. Also, good governance, favourable investment environment, commitment and responsibility of public and private sectors, effective management control, and project technical feasibility were identified as 'somehow critical' success factors (see Table 7.12).

Table 7.12 further indicates the CSFs in the concession of Muritala Mohammed Airport (MMA2) (i.e. case study 2). This includes government involvement by providing guarantees, political support, availability of suitable and adequate financial market, and project economic viability as 4 identified CSFs responsible for the level of success achieved in this PPP case study. Similarly, favourable investment environment, and strong and good private consortium were considered as 'somehow critical' success factors (see Table 7.12).

In case study 3, which is the concession of seaports, Table 7.12 reveals 8 CSFs that made this PPP project achieved the level of success it was attained. These include government involvement by providing guarantees, political support, competitive procurement process, transparency in the procurement process, project economic viability, commitment and responsibility of public and private sectors, appropriate risk allocation and risk sharing, and strong and good private consortium. While favourable investment environment, good partners' relationship, effective management control, project technical feasibility, technical innovation and technology transfer, thorough and realistic assessment of the cost and benefits, and favourable legal framework were indicated as 'somehow critical' success factors (see Table 7.12).

7.5.2 Assessment of criticality of the identified 26 success factors in PPP social infrastructure/building project case studies: using FMEA technique

This is the second set of PPP project case studies examined in this study called social infrastructure (i.e. case study 4-6) to include development of university hostel (Emerald Hostel at University of Lagos), Kanti towers modern office complex and development of Tejuosho ultra-modern shopping complex. Thus, the results of FMEA in each case study (i.e. case study 4-6) were presented in Appendix L-N respectively. Similarly, the full details

of assessment of the criticality of identified success factors in the aforementioned three case studies are summarised and presented in Table 7.13 on the next page.

Table 7.13: Summary of the assessment of criticality of success factors using FMEA technique in social infrastructure PPP project case studies

Success factors including ref. coding	Case study 4				Case study 5				Case study 6			
	Public	Private	Total	Remark	Public	Private	Total	Remark	Public	Private	Total	Remark
Political	RPN	RPN	Av. RPN		RPN	RPN	Av. RPN		RPN	RPN	Av. RPN	
Government involvement by providing guarantees/PO/F4/SF13	80	120	100	Not Critical	288	225	257	Less Critical	294	160	227	Not Critical
Political support/PO/F6/SF15	648	336	492	Less Critical	245	128	187	Not Critical	378	648	513	Somehow Critical
Good governance/PO/F1/SF03	392	175	284	Less Critical	315	175	245	Not Critical	210	336	273	Less Critical
Competitive procurement process/PO/F1/SF02	120	32	76	Not Critical	126	245	186	Not Critical	160	54	107	Not Critical
Transparency in the procurement process/PO/F1/SF01	90	60	75	Not Critical	72	216	144	Not Critical	168	105	137	Not Critical
Economic												
Availability of suitable and adequate financial market/EC/F3/SF18	630	640	635	Somehow Critical	648	720	684	Somehow Critical	448	576	512	Somehow Critical
Favourable investment environment/EC/F1/SF25	648	720	684	Somehow Critical	216	336	276	Less Critical	144	210	177	Not Critical
Project economic viability/EC/F5/SF24	720	800	760	Critical	480	448	464	Less Critical	720	810	765	Critical
Stable macroeconomic conditions/EC/F3/SF16	210	336	273	Less Critical	96	150	123	Not Critical	336	392	364	Less Critical
Sound economic policy/EC/F3/SF17	240	252	246	Not Critical	160	168	164	Not Critical	336	280	308	Less Critical
Social												
Commitment and responsibility of public and private sectors/SO/F2/SF11	448	336	392	Less Critical	112	96	104	Not Critical	504	648	576	Somehow Critical
Good partners' relationship/SO/F2/SF26	288	210	249	Not Critical	280	100	190	Not Critical	392	648	520	Somehow Critical
Consultation with end-users/SO/F5/SF21	245	336	291	Less Critical	504	448	476	Less Critical	240	336	288	Less Critical
Social support/SO/F2/SF05	180	168	174	Not Critical	160	96	128	Not Critical	280	448	364	Less Critical
Shared authority between public and private sectors/SO/F6/SF06	240	336	288	Less Critical	280	80	180	Not Critical	480	441	461	Less Critical

Note: FMEA- Failure Mode & Effect Analysis; RPN- Risk Priority Number; Criticality Scale: 1-250-Not Critical; 250-500-Less Critical; 500-750-Somehow Critical; 750-1000-Critical

Success factors including ref. coding	Case study 4				Case study 5				Case study 6			
	Public	Private	Total	Remark	Public	Private	Total	Remark	Public	Private	Total	Remark
Technological	RPN	RPN	Av. RPN		RPN	RPN	Av. RPN		RPN	RPN	Av. RPN	
Appropriate risk allocation and risk sharing/TE/F2/SF10	560	288	424	Less Critical	240	105	173	Not Critical	384	490	437	Less Critical
Effective management control/TE/F1/SF20	448	336	392	Less Critical	126	128	127	Not Critical	504	378	441	Less Critical
Project technical feasibility/TE/F4/SF09	560	648	604	Somehow Critical	810	720	765	Critical	504	486	495	Less Critical
Clear project brief and client requirements/TE/F5/SF23	420	294	714	Somehow Critical	720	648	684	Somehow Critical	486	648	567	Somehow Critical
Appropriate project identification/TE/F1/SF22	810	720	765	Critical	810	720	765	Critical	720	800	760	Critical
Technical innovation and technology transfer/TE/F2/SF19	100	252	176	Not Critical	378	504	441	Less Critical	210	180	195	Not Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	504	392	448	Less Critical	800	810	805	Critical	810	720	765	Critical
Strong and good private consortium/TE/F6/SF12	720	810	765	Critical	336	392	364	Less Critical	392	648	520	Somehow Critical
Legal												
Favourable legal framework/LE/F4/SF08	150	120	135	Not Critical	336	245	291	Less Critical	252	576	414	Less Critical
Environmental												
Well organized and committed public agency/EN/F1/SF04	336	280	308	Less Critical	294	240	267	Less Critical	378	240	309	Less Critical
Multi-benefits objectives/EN/F4/SF14	252	210	231	Not Critical	216	280	248	Not Critical	175	108	142	Not Critical

Note: FMEA- Failure Mode & Effect Analysis; RPN- Risk Priority Number; Criticality Scale: 1-250-Not Critical; 250-500-Less Critical; 500-750-Somehow Critical; 750-1000-Critical

Table 7.13 indicates the CSFs that responsible for the degree of success attained in the concession of Emerald hostel, which is case study 4 to include: project economic viability, appropriate project identification, and strong and good private consortium. While the availability of suitable and adequate financial market, favourable investment environment, project technical feasibility, and clear project brief and client requirements were identified as 'somehow critical' success factors (see Table 7.13).

The result of FMEA on criticality of the identified success factors in case study 5, which is concession of Kanti towers modern office complex reveals project technical feasibility, appropriate project identification, and thorough and realistic assessment of the cost and benefits as 3 CSFs that made this concession project achieved the level success being attained. Similarly, availability of suitable and adequate financial market, and clear project brief and client requirements were indicated as 'somehow critical' success factors (see Table 7.13).

Table 7.13 further indicates the CSFs in the concession of Tejuosho ultra-modern shopping complex (i.e. case study 6). This includes project economic viability, appropriate project identification, and thorough and realistic assessment of the cost and benefits. While political support, availability of suitable and adequate financial market, commitment and responsibility of public and private sectors, good partners' relationship, clear project brief and client requirements, and strong and good private consortium were revealed as 'somehow critical' success factors (see Table 7.13).

7.6 Cross case analysis

Based on the assessment of the criticality of identified success factors in the six PPP project case studies, it is important to consolidate the experience from these PPP case studies, to ascertain if there is any convergence or discrepancy regarding the CSFs that responsible for various degrees of success rates achieved in the six PPP case studies. Therefore, the findings from the physical infrastructure PPP project case studies to include case study 1-3, indicated that the government involvement by providing guarantees, political support, and project economic viability were identified as CSFs in all the three case studies (see Table 6.12). This finding is connected to the huge capital outlay required in the execution of these PPP projects, in which the host government is providing guarantee in form of the loans or grants to reduce the heavy financial burden on the part of concessionaires. Political support being indicated as a CSF common to these PPP project case studies. This implies that despite the

odds in executing physical infrastructure PPP projects in Nigeria, once, the political class is committed; it is most likely that the project is going to achieve appreciated success. In the same vein, project economic viability as a CSF in the three cases indicated that the projects were bankable to attract both the local and international lenders. Moreover, these PPP project case studies have the potential that the concessionaires would recover their financing before the concessions agreement expire, thus providing good investment opportunities to the concessionaires.

Similarly, the availability of suitable and adequate financial market was identified as a CSF in the case study 1&2. This finding is corroborated that the concessionaires in these two PPP project case studies were able to source for funds locally (i.e. from local banks), particularly the case study 2 that was substantially financed through the local banks in Nigeria. Also, appropriate risk allocation and risk sharing, and strong and good private consortium were revealed as CSFs in case study 1&3. Consequently, the findings revealed 10, 4, and 8 CSFs respectively in the concessions of Lekki-Epe Expressway 'case study 1', the concession of Muritala Mohammed Airport (MMA2) 'case study 2', and the concession of Seaports Terminals 'case study 3' (see Table 7.12). The difference in the number of identified CSFs in case study 1-3 resulting in different levels of success rate achieved in these three PPP case studies.

In the same vein, the findings from social infrastructure PPP project case studies (case study 4-6) to include concessions of: Emerald hostel at University of Lagos 'case study 4', Kanti towers modern office complex 'case study 5', and Tejuosho ultra-modern shopping complex 'case study 6' indicated that appropriate project identification was identified as a CSF in all the three PPP case studies. Also, project economic viability was revealed as a CSF in case study 4&6. Thorough and realistic assessment of the cost and benefits was indicated as a CSF in case study 5&6. The findings further indicated three CSFs in each of the aforementioned case studies under social infrastructure PPP projects (see Table 7.13).

7.7 CSFs emanating from case studies

Based on the results of assessment of the criticality of identified success factors using FMEA in the six PPP case studies as previously discussed, the results under physical infrastructure PPP project case studies (see Table 7.12 for details) identified a total of 13 CSFs that made the case studies attained certain degrees of success as follows:

- Government involvement in providing guarantees
- Political support
- Competitive procurement process
- Transparency in the procurement process
- Availability of suitable and adequate financial market
- Project economic viability
- Commitment and responsibility of public and private sectors
- Appropriate risk allocation and risk sharing
- Appropriate project identification
- Technical innovation and technology transfer
- Thorough and realistic assessment of the cost and benefits
- Strong and good private consortium
- Favourable legal framework

Similarly, the FMEA results under social infrastructure PPP project case studies (i.e. case study 4-6) (see Table 7.13 for details), identified a total of 5 CSFs that responsible for the success of these PPP project case studies as follows:

- Project economic viability
- Project technical feasibility
- Appropriate project identification
- Thorough and realistic assessment of the cost and benefits
- Strong and good private consortium

Based on the foregoing, the identified CSFs in both physical and social infrastructure project case studies were filtered to generate a total list of 14 CSFs. In the context of this study, the identified 14 CSFs were adopted to develop capability enhancement framework in the next chapter. Kelly & Ratchev (2009) assert that capability enhancement occurs in response to an influencer. Thus, an influencer may be either internal or external factor that must be taken into account if a given platform or system is to deliver a required outcome. Influencers are considered at a strategic level and may comprise threats, opportunities, environmental factors and internal policy changes (Kelly & Ratchev, 2009). Also, an organisation's success is influenced by political, economic, social, technological, legal, and environmental factors (i.e. PESTLE) (Ward & Rivani, 2005). Thus, an organisation can increase its success by adopting strategies that manipulate these factors (PESTLE) to its advantage. Therefore,

PESTLE can create both opportunities and threats for an organization (Buchanan & Gibb, 1998). It is against this backdrop that the identified 14 CSFs from case studies were classified based on their characteristics using PESTLE (Political; Economic; Social; Technological; Legal; and Environmental) and the parties that can influence a particular CSF. In this regards, the identified 14 CSFs from case studies are presented in Table 7.14 as follows:

Table 7.14: Classification and mapping of the identified 14 CSFs to stakeholders

PESTLE classification	Critical success factors (CSFs)/ref. coding	Stakeholders influence a particular CSF	
		Govt. & public sector authorities	Private consortium (including concessionaire, local lender/bank, consultant, and contractor
Political	Government involvement by providing guarantees/PO/F4/SF13/CSF01	✓	
	Political support/PO/F6/SF15/CSF02	✓	
	Competitive procurement process/PO/F1/SF02/CSF03	✓	✓
	Transparency in the procurement process/PO/F1/SF01/CSF04	✓	✓
Economic	Availability of suitable and adequate financial market/EC/F3/SF18/CSF05	✓	✓
	Project economic viability/EC/F5/SF24/CSF06	✓	✓
Social	Commitment and responsibility of public & private sectors/SO/F2/SF11/CSF07	✓	✓
Technological	Project technical feasibility/TE/F4/SF09/CSF08	✓	✓
	Appropriate risk allocation and risk sharing/TE/F2/SF10/CSF09	✓	✓
	Appropriate project identification/TE/F1/SF22/CSF10	✓	
	Technical innovation and technology transfer/TE/F2/SF19/CSF11		✓
	Thorough and realistic assessment of the cost and benefits/TE/F1/SF07/CSF12	✓	✓
	Strong and good private consortium/TE/F6/SF12/CSF13		✓
Legal	Favourable legal framework/LE/F4/SF08/CSF14	✓	

Note: (Mapping of the identified 14 CSFs to stakeholders is from author's view)

7.8 Chapter summary

This chapter presents the background information, findings, and a cross case analysis of the six PPP infrastructure project case studies. The CSFs responsible for different degrees of success rate achieved in the six PPP case studies have been presented in this chapter, based on FMEA technique, structured interviews, personal observations and review of documentary evidence in each case study. Also, a cross case analysis of the case studies was undertaken to ascertain if there is any convergence or discrepancy regarding the CSFs in the six case studies. The identified 14 CSFs from the case studies were presented in this chapter. In achieving the overall aim of this research, the next chapter becomes necessary to develop a stakeholder organisations capability enhancement framework for PPP infrastructure projects in Nigeria.

Chapter 8: FRAMEWORK DEVELOPMENT, VALIDATION AND EVALUATION

8.1 Introduction

In order to develop stakeholder organisations capability enhancement framework for PPP infrastructure projects in Nigeria, which is overall aim of the study, this chapter is important that combined the findings from both the quantitative and qualitative research strands (see Chapter 6 &7) to develop the framework and the expert forum was discussed. This chapter further presents the findings on stakeholder organisations current capability maturity level using the newly developed framework. The framework validation and evaluation are essential parts of a framework development process if the framework is to be accepted and used to support decision making (Macal, 2005). In this regard, this chapter describes the procedures followed in validating the framework developed in this study and also presents the results of the framework evaluation.

8.2 Criteria for selecting expert forum for verifying capability maturity levels definition (i.e. conceptual framework)

In order to refine the conceptual framework that was developed, a five-man expert panel was constituted to refine capability maturity levels definition before taking the conceptual framework to the six PPP case studies. The criteria formulated by Chan *et al*. (2001) were modified to identify eligible experts for the forum as follows:

- Having above 10 years working experience in construction industry.
- Involving directly in over 5 PPP infrastructure projects implementation.
- Having reached a managerial level in the public sector or managing director in the private sector or head of a unit in financial institutions/local banks.

Therefore, five experts were selected after satisfying the aforementioned criteria. The category of stakeholder selected for the expert forum is as follows:

- Expert 1: Local lender/Bank- First Bank of Nigeria Plc. (Head office)
- Expert 2: Public sector authorities- PPP Office, Lagos
- Expert 3: Public sector authorities- Lagos State Development and Property Corporation (LSDPC)
- Expert 4: Concessionaire- Lekki Concession Company (LCC), Lagos
- Expert 5: Consultant-Royal Haskoning DHV (Nigeria Office)

The selected experts were consented to participate in the forum. Thus, the documents encompassed cover letter; instructions; conceptual framework; capability maturity levels (1-5) characteristics; and editing document (see attached cover letter and instructions in Appendix O and P) were sent through email to a five-man expert panel. After one month, they all gave their feedback. Hence, the feedback was used to refine and improve the conceptual framework as indicated in Table 8.1, thus, research objective 5 is satisfactorily achieved. The conceptual framework was taking to the six PPP case studies for the purpose of verification of the capability maturity levels definition of the framework and determines the criticality of success factors (see Table 8.1 for the refined conceptual framework).

8.3 Framework development

In developing the stakeholder organisations capability enhancement framework for PPP infrastructure projects in Nigeria, the study made use of the quantitative and qualitative results presented in previous chapters and integrated these results with the theoretical analysis. For instance, Chapter 6 contains the results of a survey conducted on five different stakeholder organisations involved in PPP infrastructure projects. The results particularly identified success factors for PPP projects and its applicability in term of importance to PPP projects in Nigeria, thus, providing better understanding of Nigeria's PPPs environment. The identified success factors were used in developing the conceptual framework (see Table 6.12 Section 6.9 of Chapter 6).

The reasons for using success factors for capability maturity levels definition are:

- To enable the stakeholders to have a broad capture of process improvement in PPP projects implementation in Nigeria using the concept of Capability Maturity Model (CMM).
- To enable researchers in other locations/countries to have access as many as possible to already verified capability maturity levels definition. Thus, allow for a wider comparative approach.
- Researcher of this study has not known the identified success factors that would be critical for PPP infrastructure projects in Nigeria

Consequently, specific characteristics of each maturity level 1-5(i.e. Ad-hoc to Optimising) presented in Table 2.5 (see Section 2.12.2 of Chapter 2 for details) were used to define capability maturity levels 1-5 for the success factors that were identified through quantitative research strand. This led to the development of a conceptual framework for stakeholder

organisations' capability enhancement in PPP infrastructure projects, which is research objective 5. In order to refine the conceptual framework, an expert forum was constituted (see section 8.2 of Chapter 8 for details). As noted in the refined conceptual framework, several characteristics of each maturity level 1-5 (see Table 2.5 Section 2.12.2 of Chapter 2 for details) were not applicable to PPP stakeholder organisations. Thus, it was removed by the expert forum. The retained characteristics of each maturity level 1-5 with their coding reference formed the refined conceptual framework as presented in Table 8.1 on the next page.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Clear project brief and client requirements/TE/F5/ SF23	Unaware of the need for clear project brief and client requirements to PPP project outcomes ML1/Ah-C6. No formal processes/practices available ML1/Ah-C2.	Formal processes are introduced ML2/Re-C1. Commitments are established among relevant stakeholdersML2/Re-C6. Resources are provided ML2/Re-C6i. Training to perform is provided ML2/Re-C6ii.	Standard organisational processes are in place ML3/De-C2. Processes are more rigorous and proactive ML3/De-C4. Tools and database in place ML3/De-C6.	Clear project brief and client requirement processes are quantitatively analysed and stored continuously ML4/Ma-C1. Conduct post project reviews and performance reporting ML4/Ma-C6.	Clear project brief and client requirements process is continuously improved and performance optimised ML5/Op-C1. Develop a network system of coalition and partnering with private investors and transaction advisor ML5/Op-C3. Capture lessons learned and feedback loop ML5/Op-C6.
Appropriate project identification/TE/F1/ SF22	No formal processes for appropriate project identification ML1/Ah-C2. No standard methods for choosing best PPP model for the project ML1/Ah-C2. Project identification success depends on individual efforts ML1/Ah-C3.	Organisation process on project identification is developed ML2/Re-C1. Processes are planned and executed by policy ML2/Re-C1. Responsibilities are assigned ML2/Re-C6iii. Training is provided and repeated ML2/Re-C6ii.	Standard processes and procedures for appropriate project identification are developed ML3/De-C2. Standard processes are used to establish consistency across the organisation ML3/De-C3. Processes are more rigorous and managed proactively ML3/De-C4. Tools and database for appropriate project identification are in place ML3/De-C6.	Tools and database enable strategic analysis of project identification ML4/Ma-C2. Predictions are based in part, on a statistical analysis ML4/Ma-C3. Performance reporting ML4/Ma-C6	Standard processes and procedures are continuously improved ML5/Op-C1. Processes are kept up to date, seizing opportunities when circumstances change ML5/Op-C7.
Project technical feasibility/TE/F4/SF 09	No understanding of the importance of project technical feasibility to PPP project outcomes and structuring of the project ML1/Ah-C7. No project technical feasibility tools in useML1/Ah-C9.	Organisation's overall strategy is being developed ML2/Re-C1. Organisation has a clear, achievable, and measurable strategy to project technical feasibility, but no processes are in place to align the strategy with other relevant PPP partners ML2/Re-C8.	Organisation's strategy is more proactive ML3/De-C4. Organisation has identified roles and responsibilities are assigned ML3/De-C5. Tools and database are in place ML3/De-C6.	Tools and database enable strategic analysis done in alignment with the strategy of other partners ML4/Ma-C2. Strategies are regularly and formally reviewed with input from other stakeholders ML4/Ma-C7.	Develop strategic alliances, institutional arrangement, and partnering with external stakeholders ML5/Op-C3. Regular use of lessons learned and feedback to inform project technical feasibility strategies ML5/Op-C6. Measurable benefits ML5/Op-C7.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	No formal processes or practices are available ML1/Ah-C2. No tools are in use for assessment of the cost and benefits ML1/Ah-C9. Success of realistic assessment of the cost and benefits depend on individual efforts ML1/Ah-C3.	Formal processes are developed ML2/Re-C1. Commitments are established among relevant stakeholders ML2/Re-C6. Training is providedML2/Re-C6ii. Skilled personnel to produce controlled outputs are employed ML2/Re-C2	Organisation established standard processes and procedures ML3/De-C2. Processes are more rigorous and proactive ML3/De-C4. Tools and database are in place ML3/De-C6.	Tools and database are used to produce quantitative results ML4/Ma-C2. Predictions are based in part, on a statistical analysis ML4/Ma-C3. Organisation is focusing on performance improvement of processes by using statistical and other quantitative techniques ML4/Ma-C1.	Organisation continually improves the processes using sophisticated tools for both qualitative and quantitative analysis with robust interpretationsML5/Op-C11. Measurable improvement ML5/Op-C7.
Favourable legal framework/LE/F4/SF08	Unaware of the need for favourable legal framework towards PPPs ML1/Ah-C6. Small "pockets" of interest by the government in establishing favourable legal framework ML1/Ah-C7.	Favourable legal framework is being developed by government ML2/Re-C1. PPPs special laws are identified ML2/Re-C1	Favourable legal systems and PPP special laws are well understood and describe in standards and procedures ML3/De-C1. Pockets of best practice evident ML3/De-C7.	PPPs legal framework and identified PPP special laws are regularly and formally reviewed with input from other stakeholders ML4/Ma-C7.	Legal systems and PPP special laws are kept up to date and measurable benefits ML5/Op-C7
Well organized and committed public agency/EN/F1/SF04	Organisation not provides a stable environment to support processes ML1/Ah-C2. Projects success depends on individuals efforts ML1/Ah-C3.	Organisation ensured that processes were planned and executed by policy ML2/Re-C1. Weak team orientation of PPP practices and organisation good at doing repetitive works ML2/Re-C9. Commitments are established among relevant stakeholders ML2/Re-C6. Training is provided ML2/Re-C6ii.	Organisation standard processes and procedures are established ML3/De-C2. Reasonably high teamwork orientation ML3/De-C9. Task orientation management ML3/De-C10. Processes are more rigorous and proactive ML3/De-C4.	Processes performance is collected and statistically analysed ML4/Ma-C5. Strong teamwork, even with external partners ML4/Ma-C8. Strong project-driven organisation and PPPs experienced personnel ML4/Ma-C9. Organisational flexibility and willingness for change, and adaptive leadership and management style ML4/Ma-C10.	Organisation is continually improving processes performance through incremental and innovative processes, and technological improvements ML5/Op-C3. A strong project-driven organisation that is dynamic and flexible ML5/Op-C9. Enlightened leadership and management style, and strong matrix or projectizedML5/Op-C8.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Good governance/PO/F1/SF03	No understanding of the importance of good governance in achieving successful PPP projects ML1/Ah-C7. Governance is chaotic ML1/Ah-C1.	Good governance practices are emerging ML2/Re-C1. Pockets of good practice where good governance underpin sound decision-making processesML2/Re-C5.	Centrally defined organisational controls ML3/De-C5. Consistent standards of good governance across the organisation ML3/De-C3.	Organisation initiatives on good governance are aligned to the organisation's strategic objectives and priorities ML4/Ma-C4.	Organisation governance portfolio processes sufficiently dynamic to cater for rapid changes in PPP practicesML5/Op-C9. Measurable improvementML5/Op-C7.
Political support/PO/F6/SF15	Unaware of the need for political support ML1/Ah-C6. Project success depends on individual efforts ML1/Ah-C3.	Recognition of the importance of political support to PPPs ML2/Re-C7	Organisation strongly recognises the importance of political support ML3/De-C8.	Organisation recognises strong political -will from political leadership for successful PPP practices ML4/Ma-C11.	Organisation continually recognises strong "political -will" for successful PPP practicesML5/Op-C4. Organisation understands that political support should be continuously improvedML5/Op-C3.
Project economic viability/EC/F5/SF24	No understanding of project economic viability ML1/Ah-C7. No tools and database in place ML1/Ah-C9. Projects success depends on individual effortsML1/Ah-C3.	Project economic viability process is established, planned, controlled, and reviewedML2/Re-C1 & 4. Trainings and resources are providedML2/Re-C6i-ii. Responsibilities are assigned ML2/Re-C6iii.	Organisation established standard project economic viability process and procedures and improved over time ML3/De-C2. Processes are more rigorous and managed proactively ML3/De-C2. Tools and database are in place ML3/De-C6.	Organisation is focusing on performance improvement of project economic viability process by using statistical and other quantitative techniques ML4/Ma-C1. Tools and database enable strategic analysis of PPP project economic viability ML4/Ma-C2. Performance is reporting ML4/Ma-C6.	Continuous improvement of the process and performance are optimisedML5/Op-C1. Regular use of lessons learned and feedback loop in place to inform project economic viability strategiesML5/Op-C6. Measurable benefitsML5/Op-C7.
Stable macroeconomic conditions/EC/F3/SF16	Unaware of the need for stable macroeconomic conditions to achieving successful PPP projects ML1/Ah-C6.	Recognition of the importance of a stable macroeconomic condition to PPP projects implementation ML2/Re-C7.	Organisation understood the importance of a stable macroeconomic condition to PPP implementation ML3/De-C8.	Organisation uses a quantitative approach to understanding the significant of a stable macroeconomic condition to PPPs implementation ML4/Ma-C1.	Organisation continuously uses both quantitative and qualitative approach to understanding the significant of a stable macroeconomic condition to PPPs ML5/Op-C11. Organisation partner with political leadership to improve on existing macroeconomic conditions to cope with new economic demandsML5/Op-C4.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Sound economic policy/EC/F3/SF17	No understanding of the importance of sound economic policy to achieving successful PPPs ML1/Ah-C7.	Recognition of the importance of sound economic policy to deliver PPP projects ML2/Re-C7.	Organisation understood the significant of sound economic policy ML3/De-C8. Tools and database are in place ML3/De-C6.	Organisation quantitatively evaluates the economic policy ML4/Ma-C1. Predictions are based in part on a statistical analysis ML4/Ma-C3.	Organisation continuously using both quantitative and qualitative data to predict sound economic policy for successful PPPs implementationML5/Op-C11.
Consultation with end-users/SO/F5/SF21	Unaware of the need for consultation with end-users ML1/Ah-C6. No formal process in place ML1/Ah-C2.	Process for consultation with end-users in placeML2/Re-C1. Commitments are established among relevant stakeholdersML2/Re-C6.	Pockets of active consultation with end-users concerning PPP project implementation and service quality ML3/De-C10. More active and targeted information dissemination ML3/De-C11.	Continuous consultation with end-users concerning PPP project implementation and clear engagement guidelines in place ML4/Ma-C11.	Develop a network mechanism for consultation with the citizen, and sustain goodwill and long-term relationsML5/Op-C10.
Social support/SO/F2/SF05	Unaware of the need for social support and involvement ML1/Ah-C6. No attempt to recognise the benefits of social support in PPP implementation ML1/Ah-C8.	Recognition of the importance of social support to PPP project outcomes ML2/Re-C7. Engagement of public at very early of PPP project development ML2/Re-C5.	Pockets of active consultation with public concerning PPPs ML3/De-C10. The channels for engaging the public are defined and managed ML3/De-C4.	Continuous consultation with public for their total support and clear engagement guidelines in place ML4/Ma-C11.	Social support process and guidelines are continuously improvedML5/Op-C3. Measurable benefitsML5/Op-C7.
Competitive procurement process/PO/F1/SF02	No attempt to recognise the benefit of competitive procurement process ML1/Ah-C8. No tools and database in useML1/Ah-C9.	Recognition of the importance of competitive procurement process ML2/Re-C7. Organisation ensured that the process was planned and executed by policy ML2/Re-C1. Commitments are established among relevant stakeholders and revised as needed ML2/Re-C6.	Organisation established a standard process and improved over time ML3/De-C2. The process is more rigorous and managed proactively ML3/De-C4. Tools and database are in place ML3/De-C6	The process is regularly and formally reviewed with input from other stakeholders ML4/Ma-C7. Using sophisticated tools for quantitative analysis ML4/Ma-C2. Conduct post project reviews ML4/Ma-C6.	Competitive procurement process is continuously improved and performance optimizedML5/Op-C1. Using sophisticated tools for both qualitative and quantitative analyses of robust interpretations ML5/Op-C11. Measurable benefitsML5/Op-C7.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Transparency in the procurement process/PO/F1/SF01	Unaware of the need for transparency in the procurement processML1/Ah-C6. Project success depends on individual efforts ML1/Ah-C3.	Recognition of the importance of transparency in the procurement process ML2/Re-C7. The process is monitored, controlled, reviewed and evaluated for adherence to project descriptions ML2/Re-C4.	Standard process is used to establish consistency across the organisation ML3/De-C3. The process is more rigorous and proactive ML3/De-C4. Tools and database are in place ML3/De-C6.	The process performance is collected and statistically analysed ML4/Ma-C5. Conduct post project reviews ML4/Ma-C6.	Organisation continually improves the processML5/Op-C1.Capture lessons learned and feedback loop in placeML5/Op-C6. Measurable benefitsML5/Op-C7.
Favourable investment environment/EC/F1/ SF25	Unaware of the need for favourable investment environment to achieving successful PPP projects ML1/Ah-C6.	Recognition of the importance of a favourable investment environment to PPP projects implementation ML2/Re-C7.	Organisation strongly understood the importance of a favourable investment environment to PPP implementation ML3/De-C8.	Organisation uses a quantitative approach to understanding the significant of a favourable investment environment to PPPs implementation ML4/Ma-C1.	Organisation continuously using both quantitative and qualitative approach to understand the significant of a favourable investment environment to PPPsML5/Op-C11. Organisation develops strategic alliances and partnering with external stakeholders to evaluate PPP investment environmentML5/Op-C3.
Availability of suitable and adequate financial market/EC/F3/SF18	No attempt to recognise the benefit of the availability of suitable and adequate financial market to PPPs implementation ML1/Ah-C8. No tools and database in place to determine the adequate financial market for PPPs ML1/Ah-C9.	Recognition of the importance of the availability of the suitable and adequate financial market to achieving successful PPPs ML2/Re-C7.	Organisation strongly recognised the significant of suitable and adequate financial market to PPP implementation ML3/De-C8. Tools and database are in place ML3/De-C6.	Organisation uses the tools and database to determine quantitatively the suitable and adequate financial market for PPPs ML4/Ma-C2. Predictions of the financial market are based in part on statistical analysis ML4/Ma-C3.	Using sophisticated tools for both qualitative and quantitative analyses of robust interpretations of financial market for PPPsML5/Op-C11.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Government involvement by providing guarantee/PO/F4/SF 13	Unaware of the need for government involvement by providing the guarantee to achieving successful PPP outcomes ML1/Ah-C6.	Recognition of the importance of government involvement by providing the guarantee to private investors in PPPs ML2/Re-C7.	Organisation increasingly recognised the importance of government involvement by providing the guarantee in achieving successful PPP implementation ML3/De-C8.	Organisation uses quantitative techniques to determine appropriate guarantee to be provided for the private investors in PPPs implementation ML4/Ma-C1.	Organisation continually improves on the quantitative understanding of appropriate guarantee for the private investorsML5/Op-C1. Regular use of lessons learned and feedback loops in placeML5/Op-C6. Measurable benefitsML5/Op-C7.
Appropriate risk allocation and risk sharing/TE/F2/SF10	No/little understanding of the importance of risk allocation and risk sharing ML1/Ah-C7. Project success attributed to skills of individuals within the organisation ML1/Ah-C3. No risk management tools and database in use ML1/Ah-C9.	Recognition of the importance of appropriate risk allocation and risk sharing in PPPs ML2/Re-C7. Simple template and spreadsheet are used for some activities ML2/Re-C10. Training is provided ML2/Re-C6i.	Risk management process is defined to identify, allocate, share, and mitigate risks ML3/De-C5. Use of well-established template and software tools are in place ML3/De-C6.	Risk management process is regularly and formally reviewed with input from other stakeholders ML4/Ma-C7. Process performance is collected and statistically analysed ML4/Ma-C5. Using sophisticated software tools for statistical analysis ML4/Ma-C2.	Risk management process is continually improve based on a quantitative understanding of business objectives and performance needsML5/Op-C1. Using sophisticated software tools for both qualitative and quantitative analysesML5/Op-C11. Risk management process is kept up to date and measurable benefitsML5/Op-C7.
Strong and good private consortium/TE/F6/SF12	Difficulty in managing new and competing demands ML1/Ah-C4. No formal process in place to ensure strategy flows through the organisation and aligns with business partners ML1/Ah-C2.	Organisation's overall strategy is being developed ML2/Re-C1. Organisation has identified and agreed roles, responsibilities, and accountabilities for delivery ML2/Re-C8. Weak team orientation and organisation good at doing repetitive works ML2/Re-C9.	Organisation has clearly defined processes and strategies ML3/De-C5. Reasonably high team orientation ML3/De-C9. Task orientation management ML3/De-C10	Organisation strategy is regularly reviewed with input from other stakeholders ML4/Ma-C7. Strong teamwork, even with external partners ML4/Ma-C8. Organisational flexibility and willingness for change and adaptive leadership and management styleML4/Ma-C10.	Develop strategic alliances, institutional arrangement, and partnering with external stakeholdersML5/Op-C3. A strong project-driven organisation that is dynamic and flexibleML5/Op-C9. Strong organisational learning to facilitate innovation and generate new ideasML5/Op-C3. Enlightened leadership and management styleML5/Op-C8.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Shared authority between public and private sectors/SO/F6/SF06	No attempt to recognise the benefits of shared authority between public and private sectors ML1/Ah-C8.	Recognition of the importance of shared authority between the public and private sectors ML2/Re-C7. Processes/Practices are developed ML2/Re-C1	Organisations established standard practices/processes for sharing of authority between public and private sectors and improved over time ML3/De-C2. Practices are rigorous and more proactive ML3/De-C4. Reasonably high teamwork between public and private sectors ML3/De-C9.	The process is regularly and formally reviewed with input from other stakeholders ML4/Ma-C7. Strong teamwork between public and private sectors ML4/Ma-C8.	Strong cross-organisational learning to facilitate innovation and generate new ideasML5/Op-C3. Develop a network system of coalition and partnering with other stakeholdersML5/Op-C3. Regular use of lessons learned and feedback loop in placeML5/Op-C6. Measurable benefitsML5/Op-C7.
Good partners' relationship/SO/F2/SF26	Unaware of the need for a good partners' relationship in PPPs ML1/Ah-C6.	Recognition of the importance of a good partners' relationship ML2/Re-C7. Commitments are established among relevant stakeholders ML2/Re-C6	Standard processes are consistently applied to partners' relationship management ML3/De-C3. Reasonably high teamwork among the partners ML3/De-C9. Relationship process is managed proactively ML3/De-C4	The process is regularly and formally reviewed with input from other stakeholders ML4/Ma-C7. Strong teamwork, even with external partners ML4/Ma-C8. Performance reporting ML4/Ma-C6.	Leverage the good relationship with other stakeholders and cultivate goodwill with communities/usersML5/Op-C10. Develop and sustain goodwill and long-term relations with other stakeholdersML5/Op-C10. Lessons learned and feedback loop in placeML5/Op-C6.
Commitment and responsibility of public and private sectors/SO/F2/SF11	No attempt to recognise the benefits of the commitment and responsibility of the public and private sectors ML1/Ah-C8.	Recognition of the importance of commitment and responsibility to the public and private sectorsML2/Re-C7. Commitments are established among the relevant stakeholders ML2/Re-C6. Process are developed ML2/Re-C1.	Standard processes are established and revised over time ML3/De-C2. Processes are more rigorous and managed proactively ML3/De-C4. Tools and database are in place ML3/De-C6.	Process performance is collected and statistically analysed ML4/Ma-C5. Conduct post project reviews ML4/Ma-C6.	Organisation is continually improving performance through the incremental and innovative process and technological improvementML5/Op-C3. Develop societal network and community relationsML5/Op-C10. Regular use of lessons learned and feedback loop in placeML5/Op-C6.

Table 8.1: Conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria

Success factors/ref. coding	Capability maturity levels				
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
Effective management control/TE/F1/SF03	Little understanding of effective management control ML1/Ah-C7. Lip service to effective management control ML1/Ah-C10. Projects success depends on individuals efforts ML1/Ah-C3	Recognition of the importance of effective management control ML2/Re-C7. Within pockets of the organisation, basic management control practices are emerging ML2/Re-C1.	Standard practices are consistently applied to management control ML3/De-C3. Tools and database are in place ML3/De-C6. Management control programmes are more rigorous and managed proactively ML3/De-C4.	Effective management control process performance is collected and statistically analysed ML4/Ma-C5. Using sophisticated software tools for statistical analysis ML4/Ma-C2.	Management control process performance is continually improved through the incremental and innovative process and technological improvementML5/Op-C3. Using sophisticated software tools for both qualitative and quantitative analysesML5/Op-C11. Measurable benefitsML5/Op-C7.
Technical innovation and technology transfer/TE/F2/SF19	No attempt to recognise the benefits of technical innovation and technology transfer ML1/Ah-C8. Project success depends on individuals efforts ML1/Ah-C3.	Recognition of the importance of a technical innovation and technology transfer ML2/Re-C7. Training is provided ML2/Re-C6i. Responsibilities are assigned ML2/Re-C6ii	People capacity and enabling systems required to support innovation and technology transfer are in place across the organisation ML3/De-C11. Tools and database are in place ML3/De-C6.	Organisation support for innovation and technology transfer in a more strategic approach ML4/Ma-C11. Using sophisticated software tools for statistical analysis ML4/Ma-C2	Technical innovation and technology transfer process performance is continually improved through the incremental and innovative process and technological improvementML5/Op-C3.Develop a network system of coalition and partnering with vendors and contractorsML5/Op-C10. Using sophisticated software tools for both qualitative and quantitative analyses with robust interpretationML5/Op-C11. Regular use of lessons learned and feedback ML5/Op-C6. Measurable benefitsML5/Op-C7.

8.4 Framework showing the systematic process improvement for PPP projects

The final outcome of the case studies (see Chapter 7 for details) and the expert forum are: (i) the conceptual framework was thoroughly checked and verified, this means research objective 5 is completely achieved; and (ii) identification of 14 CSFs that made PPP projects successful in Nigeria, this implies that part of research objective 6 is achieved (see Table 7.14 in Chapter 7 for details). In achieving the other part of research objective 6, the identified 14 CSFs with their respective capability maturity levels definition were extracted from already verified conceptual framework (see Table 8.1). Thus, research objective 6 is completely and satisfactorily achieved. This led to the development of final stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects in Nigeria, which is research objective 7. Therefore, objective 7 is achieved.

The need for a methodical approach to process improvement has been addressed successfully by the software industry through the development of Capability Maturity Models (CMM). It is on this premise that this research adopted the concept of CMM with respect to CSFs that made PPP projects successful in Nigeria, to develop stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects in Nigeria. The findings were drawn from the literature review; questionnaire survey, case studies, and expert forum were triangulated to enhance the framework. The framework encompassed stakeholders, capability maturity matrix, and CSFs (see Table 8.2 & Table 8.3 for details). This framework provides a roadmap for improvements by indicating 'what' needs to be done in achieving higher capability maturity levels on each CSF applicable to both the public and private sector organisations in PPP infrastructure projects. The framework is therefore separated into two namely: (i) public sector organisation's capability enhancement framework in PPP infrastructure projects; and (ii) private sector organisation's capability enhancement framework in PPP infrastructure projects (see Table 8.2 & Table 8.3 for details).

The framework developed in this study gives due cognisance to top /key stakeholders in both the public and private sector organisations in PPP projects implementation. Thus, the successful implementation of this framework needs careful consideration of the drivers and barrier to PPP projects implementation, most especially the barriers, which can impinge on stakeholder organisations and framework. This is supported by Liyanage & Egbu (2008) that develop the performance management framework (PMF) for healthcare facilities

management and thus recommend a careful consideration of challenges that can affect the staff and framework. Thus, Liyanage & Egbu (2008) identify the main challenges that can affect the framework (PMF) to include cultural issues, deficiency of resources, time constraints among others. It is against this backdrop that this study through a rigorous field work identified the drivers and barriers to PPP projects in Nigeria and provided in a user guide for the framework (see Appendix T for details). The framework is expected to enhance the success rate of PPP infrastructure projects in Nigeria. Thus, the framework is presented on the next page.

Table 8.2: Public sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
A. Project identification/ TE/F1/SF22/CSF10	No formal process for PPP projects identification. Project identification success depends on individual efforts.	Project identification process is developed. The process is planned and executed by policy. Training is provided and repeated.	Standard process and procedures for project identification are established. Standard process is used to establish consistency across the organisation. The process is more rigorous and managed proactively. Tools and database are in place.	Tools and database enable strategic analysis of project identification. Predictions are based in part, on a statistical analysis. Performance reporting.	Appropriate project identification is achieved. Standard process and procedures are continuously improved. Processes are kept up to date, seizing opportunities when circumstances change.
	1. No proven process. 2. Process is chaotic. 3. Unable to repeat success. 4. Process group to bootstrap the process is established. 5. Project success depends on individual efforts.	1. There is a plan for performing the process. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Training is provided.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Quality and process performance objectives are established. 2. Capture lessons learned and feedback. 3. Continually improving process performance through an innovative process and technological improvement. 4. Strong project driven and flexible. 5. Leverage good relationship with other stakeholders.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
B. Project technical feasibility/ TE/F4/SF09/CSF08	No understanding of the importance of project technical feasibility to PPP project outcomes. No project technical feasibility tools in use.	Organisation's overall strategy is being developed. Organisation has a clear and measurable strategy to project technical feasibility, but no process is in place to align the strategy with other relevant PPP partners.	Organisation's strategy is more proactive and aligned with relevant PPP partners. Tools and database are in place.	Tools and database enable strategic analysis done in alignment with the strategy of other partners. Strategies are regularly and formally reviewed with input from other stakeholders.	Project technical feasibility with due diligence is achieved. Organisation has developed strategic alliances, institutional arrangement, and partnering with external stakeholders. Regular use of lessons learned and feedback to inform project technical feasibility strategies. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. Skilled people are employed. 2. Resources are provided. 3. Responsibilities are assigned. 4. The process is controlled and monitored. 5. Training is provided	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more rigorous and proactive 5. Tools and database are in place.	1. Quantitative objectives are established. 2. Tools and database are in use for statistical analysis. 3. The process is controlled using statistical and other quantitative techniques. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Develop societal network and community relations.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
C. Assessment of the cost and benefits/ TE/F1/SF07/CSF12	No formal processes or practices are available. No tools are in use for assessment of the cost and benefits. The success depends on individual efforts.	Formal processes are developed. Commitments are established among relevant stakeholders. Skilled personnel to produce controlled outputs are employed.	Standard processes and procedures are established. Processes are more rigorous and proactive. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Thorough and realistic assessment of cost and benefits is achieved. Organisation is focusing on performance improvement of processes by using sophisticated tools for both qualitative and quantitative analysis with robust interpretations. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Process is performed but exceeds the budget and schedule.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
D. Project economic viability/ EC/F5/SF24/CSF06	No understanding of project economic viability. No tools and database in place. Projects success depends on individual efforts.	Project economic viability process is established and planned. Training and resources are provided.	Organisation established standard project economic viability process and procedures and improved over time. Processes are more rigorous and managed proactively. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Organisation focuses on performance improvement of project economic viability process by using both qualitative and quantitative analysis to generate a robust interpretation. Regular use of lessons learned and feedback loop in place to inform project economic viability strategies. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
E. Competitive procurement process/ PO/F1/SF02/CSF03	No attempt to recognise the importance of competitive procurement process. No tools and database in use.	Recognition of the importance of competitive procurement process. Organisation ensured that the process is planned and executed by policy, but no standard process established.	Organisation established a standard process and improved over time. The process is more rigorous and managed proactively. Tools and database are in place.	The process is regularly and formally reviewed with input from other stakeholders. Using sophisticated tools for quantitative analysis. Conduct post project reviews.	Competitive procurement is achieved. The competitive procurement process is continuously improved and performance optimised. Using sophisticated tools for both qualitative and quantitative analyses of robust interpretations. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
F. Transparency in the procurement process/ PO/F1/SF01/CSF04	Unaware of the need for transparency in the procurement process. Project success depends on individual efforts.	Recognition of the importance of transparency in the procurement process. The process is monitored and evaluated for adherence to project descriptions.	Standard process is used to establish consistency across the organisation. The process is more rigorous and proactive. Tools and database are in place.	Process performance is collected and statistically analysed. Conduct post project reviews.	Transparency in the procurement is achieved. Organisation continually improves the process. Capture lessons learned and feedback loop in place. Measurable benefits.
	1. No stable environment to support the process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. The process is performed but exceeds the budget and schedule.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
G. Risk allocation and risk sharing/ TE/F2/SF10/CSF09	Little understanding of the importance of risk allocation and risk sharing. Project success attributed to skills of individuals within the organisation. No risk management tools and database in use.	Recognition of the importance of risk allocation and risk sharing in PPPs. Simple template and spreadsheet are used for some activities.	Risk allocation and sharing process are defined. Well-established template and software tools are in place.	Risk allocation and sharing process are rigorous and proactive. The process is regularly and formally reviewed with input from other stakeholders. Using sophisticated software tools for statistical analysis. Predictions are based in part on the statistical analysis.	Appropriate risk allocation and risk sharing to the best party to manage it effectively and efficiently is achieved in PPPs implementation. The risk allocation and sharing process is continually improved using sophisticated software tools for both qualitative and quantitative analyses.
	1. No stable environment to support the process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
H. Commitment and responsibility of public and private sectors/ SO/F2/SF11/CSF07	No attempt to recognise the importance of commitment and responsibility of public and private sectors.	Recognition of the importance of commitment and responsibility to the public and private sectors. Commitments are established among relevant stakeholders. The process is emerging.	Standard processes are established and revised over time. The processes are more rigorous and managed proactively. Tools and database are in place.	Processes performance is collected and statistically analysed. Conduct post project reviews.	Strong commitment and responsibility of public and private sectors is achieved. Public and private organisations are continually improving performance through an incremental and innovative process and technological improvement. Develop societal network and community relations. Regular use of lessons learned and feedback loop in place.
	1. Unaware of the need for the process. 2. No proven process. 3. The process is chaotic. 4. Unable to repeat success. 5. The process group is established to bootstrap the process.	1. The process is introduced. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. Standard processes are established. 2.Reasonably high teamwork 3. The processes are improved over time. 4. The processes are more rigorous and proactive 5. Tools and database are in place.	1. Quantitative objectives for quality and process performance are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using the statistical analysis. 4.Organisational flexibility and willingness for change 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both the qualitative and quantitative analysis for process improvement. 4. Capture lessons learned and feedback. 5. Leverage a good relationship with other stakeholders, and develop a societal network and community relations.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authority)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
I. Legal framework LE/F4/SF08/CSF14	Unaware of the need for legal framework towards PPPs. Little interest in establishing a legal framework.	The legal framework is being developed but no PPPs special laws.	The legal framework and PPP special laws are well defined and described in standards and procedures. Pockets of best practice evident.	Legal framework and PPP special laws are regularly and formally reviewed with input from other stakeholders.	Favourable legal framework achieved. Continually focussing on improvement in line with international best practices. The process kept up-to-date and measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. The process is chaotic. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is developed. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. Standard process is established. 2. The process is improved over time. 3. The process is more rigorous and proactive 4. Pockets of best practice evident. 5. Task orientation management.	1. Quantitative objectives for quality and process performance are established. 2. Specific measures of process performance are collected and statistically analysed. 3. The process is aligned to organisation's strategic objectives and priorities 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both qualitative and quantitative analysis for process improvement. 4. Enlightened leadership and management style. 5. Leverage a good relationship with other stakeholders, and develop a societal network and community relations.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authority)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
J. Political support/ PO/F6/SF15/CSF02	Lip-service by political leaders in supporting PPP projects. Project success depends on individual efforts.	Recognition the importance of political support to PPPs.	Strong recognition of the importance of political support to PPPs. Pockets of best practice evident.	The process is regularly and formally reviewed with input from other stakeholders.	Political support achieved. Continually improving process performance through an innovative process. Regular use of lessons learnt from international best practices and feedback loop in place to inform the satisfaction of political support for PPPs project.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is introduced. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. Standard process is established. 2. The process is improved over time. 3. The process is more rigorous and proactive 4. Pockets of best practice evident. 5. Task orientation management.	1. Means for improvement are established. 2. Quantitative objectives for quality and process performance are established. 3. Organisational flexibility and willingness for change 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both the qualitative and quantitative analysis for process improvement. 4. Enlightened leadership and management style. 5. Leverage a good relationship with other stakeholders, and develop a societal network and community relations.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authority)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
K. Financial market/ EC/F3/SF18/CSF05	No attempt to recognise the importance of suitable and adequate financial market to PPPs implementation. The financial market is chaotic.	Recognition of the importance of suitable and adequate financial market to achieving successful PPPs.	Strong recognition of the significant of availability of suitable and adequate financial market to PPP implementation. Tools and database are in place.	Establishing quantitative objectives for quality and process performance. Predictions are based in part on a statistical analysis.	Availability of suitable and adequate financial market for PPPs achieved. Using sophisticated tools for both qualitative and quantitative analyses of robust interpretations of the financial market.
	1. No stable environment to support process. 2. No proven process. 3. The process is chaotic. 4. No tools and database in place 5. Project success depends on individual efforts.	1. The process is introduced. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both the qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Public sector authorities (including ministries, department, agencies and local authority)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
L. Government involvement by providing guarantees/ PO/F4/SF13/CSF01	The government is unaware of the need to provide guarantees in achieving successful PPP outcomes.	The government recognises the importance of their involvement by providing guarantees to the private investors in PPPs.	The government strongly recognises significant of their involvement by providing guarantees of different forms to the private investors in PPPs implementation. Pockets of best practice evident.	Government using a quantitative technique to determine appropriate guarantee to be provided for the private investors in PPPs implementation. Predictions of appropriate guarantee are based in part on the statistical analysis.	The government is continually improving on the quantitative and qualitative approaches to providing guarantees for the private investors in PPPs. The framework for government involvement in providing guarantees to the private investors in PPP project is established. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. The process is chaotic. 4. No tools and database in place 5. Project success depends on individual efforts	1. The process is introduced. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
A. Project technical feasibility/ TE/F4/SF09/CSF08	No understanding of the importance of project technical feasibility to PPP project outcomes. No project technical feasibility tools in use.	Organisation's overall strategy is being developed. Organisation has a clear and measurable strategy to project technical feasibility, but no process is in place to align the strategy with other relevant PPP partners.	Organisation's strategy is more proactive and aligned with relevant PPP partners. Tools and database are in place.	Tools and database enable strategic analysis done in alignment with the strategy of other partners. Strategies are regularly and formally reviewed with input from other stakeholders.	Project technical feasibility with due diligence is achieved. Organisation has developed strategic alliances, institutional arrangement, and partnering with external stakeholders. Regular use of lessons learned and feedback to inform project technical feasibility strategies. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. Skilled people are employed. 2. Resources are provided. 3. Responsibilities are assigned. 4. The process is controlled and monitored. 5. Training is provided	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more rigorous and proactive 5. Tools and database are in place.	1. Quantitative objectives are established. 2. Tools and database are in use for statistical analysis. 3. The process is controlled using statistical and other quantitative techniques. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both the qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Develop a societal network and community relations.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
B.Assessment of the cost and benefits/ TE/F1/SF07/CSF12	No formal processes or practices are available. No tools are in use for assessment of the cost and benefits. The success depends on individual efforts.	Formal processes are developed. Commitments are established among relevant stakeholders. Skilled personnel to produce controlled outputs are employed.	Organisation established standard processes and procedures. The processes are more rigorous and proactive. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Thorough and realistic assessment of cost and benefits is achieved. Organisation is focusing on performance improvement of processes by using sophisticated tools for both qualitative and quantitative analysis with robust interpretations. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. The process is performed but exceeds the budget and schedule.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both the qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
C. Project economic viability/ EC/F5/SF24/CSF06	No understanding of project economic viability. No tools and database in place. Projects success depends on individual efforts.	Project economic viability process is established and planned. Training and resources are provided.	Organisation established standard project economic viability process and procedures and improved over time. The processes are more rigorous and managed proactively. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Organisation focuses on performance improvement of project economic viability process by using both the qualitative and quantitative analysis to generate a robust interpretation. Regular use of lessons learned and feedback loop in place to inform project economic viability strategies. Measurable benefits.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both the qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
D. Financial market/ EC/F3/SF18/CSF05	No attempt to recognise the importance of suitable and adequate financial market to PPPs implementation. The financial market is chaotic.	Recognition of the importance of suitable and adequate financial market to achieving successful PPPs.	Strong recognition of the significant of availability of suitable and adequate financial market to PPP implementation. Tools and database are in place.	Establishing quantitative objectives for quality and process performance. Predictions are based in part on a statistical analysis.	Availability of suitable and adequate financial market for PPPs is established. Using sophisticated tools for both qualitative and quantitative analyses of robust interpretations of the financial market.
	1. No stable environment to support process. 2. No proven process. 3. The process is chaotic. 4. No tools and database in place 5. Project success depends on individual efforts.	1. The process is introduced. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
E. Risk allocation and risk sharing/ TE/F2/SF10/CSF09	Little understanding of the importance of risk allocation and risk sharing. Project success attributed to skills of individuals within the organisation. No risk management tools and database in use.	Recognition of the importance of risk allocation and risk sharing in PPPs. Simple template and spreadsheet are used for some activities.	Risk allocation and sharing process are defined. Well-established template and software tools are in place.	Risk allocation and sharing process are rigorous and proactive. The process is regularly and formally reviewed with input from other stakeholders. Using sophisticated software tools for statistical analysis. Predictions are based in part on the statistical analysis.	Appropriate risk allocation and risk sharing to the best party to manage it effectively and efficiently is achieved in PPPs implementation. The risk allocation and sharing process are continually improved using sophisticated software tools for both the qualitative and quantitative analyses.
	1. No stable environment to support the process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both the qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
F. Strong and good private consortium/ TE/F6/SF12/CSF13	Difficulty in managing new and competing demands. Project success depends on individual efforts.	Weak team orientation and organisation good at doing repetitive works.	Reasonably high team orientation. Task orientation management.	Strong teamwork, even with external partners. Organisational flexibility and willingness for change and adaptive leadership.	Strong and good private consortium with vastly skilled personnel, experienced and capable project team. A strong project-driven organisation that is dynamic and flexible. Strong organisational learning to facilitate innovation and generate new ideas. Enlightened leadership and develop strategic alliances, institutional arrangement, and partnering with external stakeholders.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. There is a plan for performing. 2. Resources are provided. 3. Responsibilities are assigned. 4. Skilled people are employed. 5. Commitments are established among relevant stakeholders.	1. Standard processes are established. 2.Reasonably high teamwork 3. The processes are improved over time. 4. The processes are more rigorous and proactive 5. Tools and database are in place.	1. Quantitative objectives for quality and process performance are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Organisational flexibility and willingness for change. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both the qualitative and quantitative analysis for process improvement. 4. Capture lessons learned and feedback. 5. Leverage a good relationship with other stakeholders, and develop a societal network and community relations.

Table 8.3: Private sector organisation capability enhancement framework in PPP infrastructure projects in Nigeria

CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
G. Commitment and responsibility of public and private sectors/ SO/F2/SF11/CSF07	No attempt to recognise the importance of commitment and responsibility of public and private sectors.	Recognition of the importance of commitment and responsibility of public and private sectors. Commitments are established among relevant stakeholders. The process is emerging.	Standard processes are established and revised over time. The processes are more rigorous and managed proactively. Tools and database are in place.	Processes performance are collected and statistically analysed. Conduct post project reviews.	Strong commitment and responsibility of the public and private sectors is achieved. The public and private organisations are continually improving performance through an incremental and innovative process and technological improvement. Societal network and community relations are developed. Regular use of lessons learned and feedback loop in place.
	1. Unaware of the need for the process. 2. No proven process. 3. The process is chaotic. 4. Unable to repeat success. 5. The process group is established to bootstrap the process.	1. The process is introduced. 2. The process is evaluated for adherence to descriptions. 3. The process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed.	1. Standard processes are established. 2.Reasonably high teamwork 3. The processes are improved over time. 4. The processes are more rigorous and proactive 5. Tools and database are in place.	1. Quantitative objectives for quality and process performance are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4.Organisational flexibility and willingness for change 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both the qualitative and quantitative analysis for process improvement. 4. Capture lessons learned and feedback. 5. Leverage a good relationship with other stakeholders, and develop a societal network and community relations.

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CSFs/ Ref. coding	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lender/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimising
H. Technical innovation and technology transfer/ TE/F2/SF19/CSF11	No attempt to recognise the importance of technical innovation and technology transfer. Project success depends on individuals efforts.	Recognition of the importance of a technical innovation and technology transfer. Training is provided.	People capacity and enabling systems required to support technical innovation and technology transfer are in place across the organisation. Tools and database are in place.	Organisation support for technical innovation and technology transfer in a more strategic approach. Using sophisticated software tools for statistical analysis.	Technical innovation and technology transfer is achieved in all the activities/projects undertaken. The process performance is continually improving through an incremental and innovative process, and technological improvement. Develop a network system of coalition and partnering with vendors and contractors. Organisation uses sophisticated software tools for both the qualitative and quantitative analyses with robust interpretation.
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts.	1. The process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. The process is controlled and monitored.	1. The process is characterised and understood. 2. Standard process is established. 3. The process is improved over time. 4. The process is more consistently defined. 5. Tools and database are in place.	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. The process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners.	1. Using a quantitative approach to understanding variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both the qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through an incremental and innovative process, and technological improvement.

8.5 Assessment/internal validation of the framework

The researcher presented the framework to already interviewed key stakeholders (i.e. top management) in the six PPP project case studies (see Table 7.5 in Chapter 7 for interviewees' detail). As previously discussed, in each case study three top managements were selected from the public sector (i.e. ministries, departments and agencies) and three from the private sector (including consultants, concessionaires, local lenders/banks, and contractors). This resulting in a total of thirty-six key stakeholders from both the public and private sector organisations (i.e. eighteen from the public sector and eighteen from the private sector) in the six case studies (see Table 7.5 in Chapter 7 for details). These key stakeholders were prospective users of the framework. Thus, the purpose of presented the framework to the key stakeholders in the case studies are to:

- enable the stakeholders assess and identify any process issues not addressed in the framework;
- internally validate the framework, based on suitability and applicability of the framework in PPP projects in Nigeria; and
- determine if the recommendations derived are meaningful

The case studies assessment on any process issues not addressed in the framework revealed that stakeholders were satisfied with the framework, but several comments were raised as follows:

- *"Though not part of the framework, but it is important to prepare the mind of stakeholders on constraints that can influence their organisations maturity on those critical success factors in the framework in Nigeria".*
- *"The terminology of the framework needs explanation".*
- *"The framework especially the one for the public sector organisation is voluminous".*

The case studies assessment on suitability and applicability of the framework showed a consensus among the stakeholders that the framework is suitable for use and has practical relevance in PPP projects implementation particularly in Nigeria. Several of the stakeholder responses are as follows:

1. A project consultant in case study 3 has this to say:
"*The framework is first of its kind in implementing PPP projects in Nigeria. It offers a useful guide"* (Team leader at Royal DHV, Lagos).

2. A stakeholder from Lagos State Development and Property Corporation (LSDPC) that involved in case study 5 said:
"The framework is logical, clear and very useful. But if it can be assessed electronically, it would facilitate the usage" (Manager at LSDPC-Quantity surveying unit).

3. A stakeholder from Lagos State Public Private Partnership (PPP) Office that involved in case study 1 said:
"This is a thorough framework for measuring the maturity of different stakeholder organisations on critical success factors. The framework captured all critical success factors that always present in successful PPP projects in Nigeria. Therefore, the framework can be used as an assessment tool for prequalification of bidders in future PPP projects in Nigeria" (Team leader at Lagos State PPP Office-Procurement unit).

Based on these selected responses and other meaningful recommendations made by the stakeholders, it is evident that the framework is relevant and very useful in PPP projects implementation in Nigeria and the stakeholders are happy to use the framework.

8.6 Framework showing the current capability maturity levels of stakeholder organisations involved in six PPP project case studies

After the case studies assessment of the framework has been conducted, the framework was presented back to the aforementioned stakeholders in the six case studies. This is to enable the stakeholders use the framework in assessing their organisations current capability maturity levels. In achieving this, a scoring point was provided in the framework of each capability maturity level 1-5 (see Appendix Q and Appendix R for details). Consequently, within a particular capability maturity level (i.e.1-5), an identified factors characteristics were also provided, thus used as the criteria for the rating of the interview questions with respect to each CSF. In this regard, a scale rating 1-5 was developed to rate the extent the stakeholder organisations have gone into a particular capability maturity level they belong. Sample portion of assessment tool for stakeholder organisations current capability maturity levels is presented in Table 8.4 on the next page.

Table 8.4: Sample portion of assessment tool for stakeholder organisation current capability maturity levels in PPP infrastructure projects

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Project identification	No formal process for PPP projects identification. Project identification success depends on individual efforts.	Project identification process is developed. Process is planned and executed in accordance with policy. Trainings are provided and repeated.	Standard process and procedures for project identification are established. Standard process is used to establish consistency across the organisation. Process is more rigorous and managed proactively. Tools and database are in place.	Tools and database enable strategic analysis of project identification. Predictions are based in part, on a statistical analysis. Performance reporting.	Appropriate project identification is achieved. Standard process and procedures are continuously improved. Processes are kept up to date, seizing opportunities when circumstances change.
Score	☐	☐	☐	☐	☐
	1. No proven process. 2. Process is chaotic. 3. Unable to repeat success. 4. Process group to bootstrap the process is established. 5. Project success depends on individual efforts. 1 2 3 4 5	1. There is plan for performing the process. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Trainings are provided. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Quality and process performance objectives are established. 2. Capture lessons learned and feedback. 3. Continually improving process performance through innovative process and technological improvement. 4. Strong project driven and flexible. 5. Leverage good relationship with other stakeholders. 1 2 3 4 5

Note: Details provided in Appendix Q & R (The steps and worked example in using this assessment tool is provided in Appendix T)

Therefore, based on the structured interviews, personal observation, review of documentary evidences on the six case studies, and the framework as an assessment tool (see Table 8.4 and for details see Appendix Q & R) coupled with quantitative assessment as a support tool for making an overall assessment of both the public and private organisations current capability maturity levels and for comparison approach. It is on this premise that the researcher was able to assess the current capability maturity levels of stakeholder organisations involved in the six PPP project case studies. This approach is supported by previous researchers. For instance, Bay & Skitmore (2006) quantitatively assessed the level of project management maturity in Indonesian companies. Tembo & Rwelamila (2008) quantitatively measured project management maturity in public sector organisation in Botswana. Cooke-Davies & Arzymanow (2003) quantitatively assessed the maturity of project management in six different industries. Rwelamila & Phungula (2009) adopted quantitative assessment when exploring organisational project management maturity of the South African public institutions involved in public-private partnership (PPP) projects among others. Thus, the average total scores for each of the assessed CSF in the framework of both the public and private sector stakeholder organisations in the six case studies are presented in Table 8.5 on the next page.

Table 8.5: Stakeholder organisations current capability maturity levels on the assessed CSFs in the framework in the six PPP case studies

No	Critical success factors (CSFs)	Stakeholder organisations current capability maturity levels												Overall average scores	
		Case study1		Case study 2		Case study 3		Case study 4		Case study 5		Case study 6			
		public sector	private sector	public sector	Private sector	public sector	Private sector	public sector	private sector	public sector	Private sector	public sector	Private sector	**public sector**	**Private sector**
A	Government involvement by providing guarantees	2.80	n/a	1.60	n/a	2.20	n/a	1.80	n/a	2.60	n/a	1.40	n/a	2.07	n/a
B	Political support	2.80	n/a	2.40	n/a	2.20	n/a	1.60	n/a	1.80	n/a	1.60	n/a	2.07	n/a
C	Competitive procurement process	2.80	n/a	1.20	n/a	2.60	n/a	1.60	n/a	2.60	n/a	2.40	n/a	2.20	n/a
D	Transparency in the procurement process	2.20	n/a	1.20	n/a	2.20	n/a	1.40	n/a	1.40	n/a	1.60	n/a	1.67	n/a
E	Availability of suitable and adequate financial market	2.60	3.20	2.40	2.80	2.20	3.20	2.60	2.60	2.20	2.40	2.20	2.60	2.37	2.80
F	Project economic viability	2.80	3.80	2.60	2.60	2.60	4.20	1.80	2.40	2.80	3.20	2.40	3.60	2.50	3.30
G	Commitment and responsibility of public & private sectors	2.60	3.20	1.20	1.60	1.80	2.20	1.60	1.80	2.40	2.60	2.60	2.80	2.03	2.37
H	Project technical feasibility	2.80	3.20	1.40	2.20	1.20	3.80	2.60	2.20	1.20	2.20	1.40	2.80	1.78	2.73
I	Appropriate risk allocation and risk sharing	2.60	3.40	1.20	1.20	1.40	3.20	1.40	2.40	1.60	2.20	1.60	2.60	1.63	2.50
J	Appropriate project identification	2.60	n/a	1.60	n/a	1.80	n/a	2.80	n/a	1.60	n/a	1.80	n/a	2.03	n/a
K	Technical innovation and technology transfer	n/a	3.40	n/a	2.40	n/a	3.60	n/a	1.80	n/a	2.60	n/a	2.40	n/a	2.70
L	Thorough and realistic assessment of the cost and benefits	2.80	3.80	1.40	2.80	2.20	3.60	2.20	2.40	1.60	2.80	2.20	2.60	2.07	3.00
M	Strong and good private consortium	n/a	3.40	n/a	2.60	n/a	3.60	n/a	1.60	n/a	2.60	n/a	2.80	n/a	2.77
N	Favourable legal framework	2.80	n/a	1.40	n/a	2.20	n/a	1.80	n/a	1.60	n/a	2.40	n/a	2.03	n/a

Note- Ad hoc: 1.00-1.99; Repeatable: 2.00-2.99; Defined: 3.00-3.99; Managed: 4.00-4.99; Optimising: 5.00

n/a- not applicable

Table 8.5 reveals the current capability maturity levels of the stakeholder organisations in the six PPP project case studies from both the public and private sector organisations on 14 CSFs employed in developing the framework for this study. As shown in Table 8.5, 12 (out of 14) CSFs assessed were applied to the public sector organisations, while 8 (out of 14) CSFs applicable to the private sector organisations. The results are as follows:

- Case study 1: The current capability maturity levels for the public sector organisations ranging from 2.20 to 2.80 (out of 5), which is level 2 (repeatable). While the private sector organisation current capability maturity levels were ranging from 3.20 to 3.80, which is level 3 (defined).

- Case study 2: The findings indicate that the current capability maturity levels for the public sector organisations were between 1.20 and 2.60 (out of 5), which is level 1 (ad hoc) and level 2 (repeatable). On the other hand, the private sector organisation current capability maturity levels were between 1.20 and 2.80, which is level 1 (ad hoc) and level 2 (repeatable). This result indicates that both the public and private sector organisations were in the same capability maturity levels.

- Case study 3: The results shows that the public sector organisations current capability maturity levels were ranging from 1.20 to 2.60 indicating level 1 (ad hoc) and level 2 (repeatable). While the private sector organisation current capability maturity levels were varying from 2.20 to 4.20, this cut across level 2 (repeatable), level 3 (defined) and level 4 (managed).

- Case study 4: The findings reveals that the current capability maturity levels for the public sector organisations were between 1.40 and 2.80, which is level 1 (ad hoc) and level 2 (repeatable). While the private sector organisation's current capability maturity levels were between 1.60 and 2.60, which is level 1 (ad hoc) and level 2 (repeatable).

- Case study 5: The results indicate that the public sector organisations current capability maturity levels were ranging from 1.20 to 2.80 indicating level 1 (ad hoc) and level 2 (repeatable). While the private sector organisation's current capability maturity levels were varying from 2.20 to 3.20 signifying level 2 (repeatable) and level 3 (defined).

- Case study 6: The findings indicate that the current capability maturity levels for the public sector organisation were between 1.40 and 2.60, which is level 1 (ad hoc) and level 2 (repeatable). On the other hand, the private sector organisation's current capability maturity levels were between 2.40 and 3.60, which is level 2 (repeatable) and level 3 (defined).

The capability maturity levels attained under each CSF by both the public and private sector organisations in the six case studies are further illustrated in Figure 8.1 & Figure 8.2 as follows:

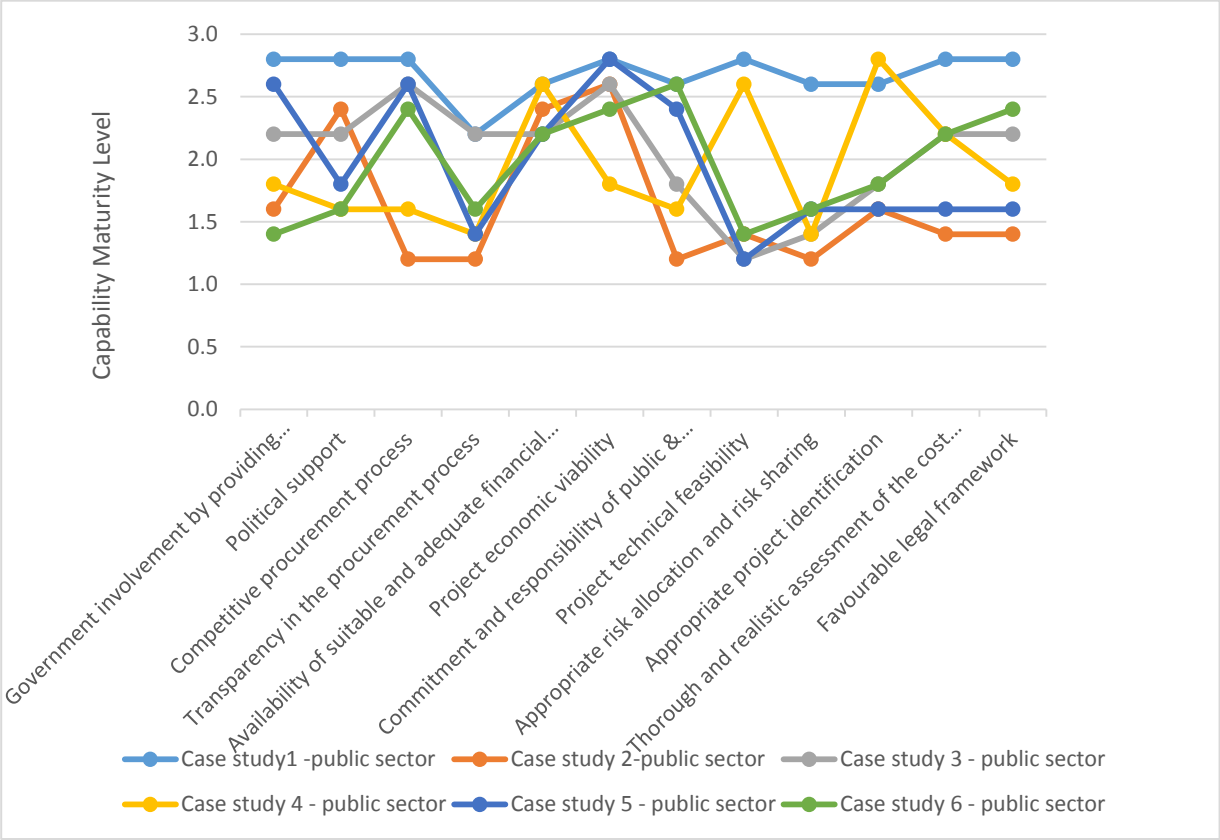

Figure 8.1: Current capability maturity level of the public sector organisations in PPP infrastructure projects in Nigeria

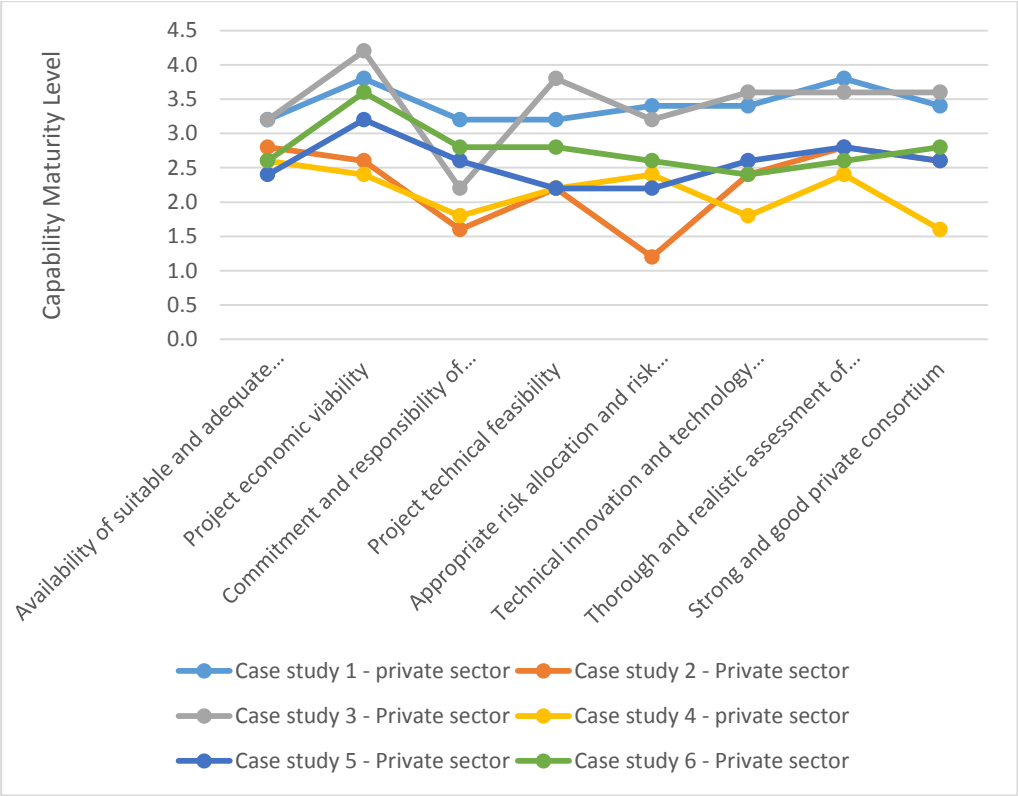

Figure 8.2: Current capability maturity level of the private sector organisations in PPP infrastructure projects in Nigeria

The overall assessment of the current capability maturity levels of the stakeholder from both the public and private sector organisations on the CSFs (see Table 8.5, Figure 8.1 and Figure 8.2) that made the six PPP project case studies successful reveals that:

- Public sector organisations (including ministries, departments, agencies, and local authority) have low capability maturity levels between level 1 (ad hoc) and level 2 (repeatable) on CSFs applicable to them. For instance, the public sector organisations were in level 1 (ad hoc) on project technical feasibility, transparency in the procurement process, and appropriate risk allocation and risk sharing with their overall average scores of 1.78, 1.67, and 1.63 respectively. Thus, these scores were equivalent to 35.6%, 33.4%, and 32.6% respectively of the overall total score of 5 points assigned to the maximum point achievable (see Table 8.5 and Figure 8.1 for details). This finding is similar to previous studies. For instance, Rwelamila (2007) found that the public sector organisations involved in large infrastructure projects in South Africa were at the lowest level of maturity, which is level 1 (out of 5 maturity levels). Rwelamila & Phungula (2009) found that project management maturity of the South African public sector organisations involved in PPP projects were in maturity level 1 (out of 5 maturity levels) which is ‘ad hoc’. Tembo & Rwelamila

(2008) found an average maturity level of 2.3, which is maturity level 2 in all project management knowledge areas in the public sector organisations responsible for infrastructure development in Botswana among others.

- The private sector organisations (including concessionaires, local lenders/banks, contractors, and consultants) have capability maturity levels varying from 2.37 to 3.30 (see Table 8.5 and Figure 8.2 for details), which is level 2 (repeatable) and level 3 (defined). The private sector organisations were in level 3 (defined) on both the project economic viability, and thorough and realistic assessment of the cost and benefits with their overall average scores of 3.30 and 3.00 equivalents to 66% and 60% of the overall total score of 5 points assigned to the maximum point achievable. Also, the private sector organisations were in level 2 (repeatable) on the other CSFs applicable to them (see Table 8.5 and Figure 8.2 for details).

8.7 Framework external validation and evaluation

Framework validation is critical to ensure the quality of the research outcomes (Cheung, 2009). This is affirmed by Awodele (2012) that framework validation and evaluation are complementary in nature and both are required to prove the reliability and validity of a given framework. Given this, validation is carried out on the stakeholder organisations capability enhancement framework developed in this study to ensure the framework is structured correctly and the specifications of the framework are clear and complete. In order to validate the framework, the potential end users of the framework with whom the validation would be carried out were identified to include top management from: (i) public sector authorities comprising ministries, departments and agencies at both federal and state levels, as well as local government officials; (ii) private sector including consultants, concessionaires, local lenders/banks, and contractors; and (iii) academia. This study validation process is similar to earlier studies. For example, Liyanage & Egbu (2008) refine and validate the performance management framework (PMF) for healthcare facilities using the views of practitioners and academia, and the academia were mainly university lecturers and professors. Cheung (2009) validates a best practice framework for implementing PPPs in Hong Kong using nine respondents comprised PPP experts and academia among others. This section, therefore, presents the findings of the external validation of the framework developed in this study.

8.7.1 **Design of the validation questionnaire survey**

In order to validate the capability enhancement framework developed in this study, a questionnaire survey was conducted. This survey was based on a similar validation process undertaken by previous researchers. For instance, Yeung (2007) adopts questionnaire survey to validate the partnering performance index model. Cheung (2009) conducts questionnaire survey to validate the best practice framework for implementing PPP projects in Hong Kong. Awodele (2012) employs questionnaire survey to validate the framework for managing risk in the privately financed project in Nigeria among others. Against this backdrop, this study adopted a questionnaire survey. Thus, the following criteria were set-up to select the respondents among the prospective users:

- Having extensive working experience in PPP projects in Nigeria.
- Involving directly, recently, or currently in PPP projects in Nigeria.
- Having reached a managerial level in the public sector or managing director in the private sector or active researcher in academia.

Therefore, among the potential users that met the aforementioned criteria, nine prospective users (respondents) were selected for objectivity to include three each from the public sector, the private sector, and academia. Thus, an e-mail invitation/request for participation in the validation and evaluation stage of the framework was sent to the nine selected prospective users. The nine selected end users (respondents) were agreed to participate in the validation exercise. It is at this time that an evaluation instrument (i.e. questionnaire) was sent with the framework to the identified respondents via email (see Appendix S for a copy of the evaluation instrument). The respondents were asked to rate the framework based on six assessment criteria employed by Yeung (2007), Cheung (2009), and Awodele (2012). The six assessment criteria include: comprehensiveness; objectivity; practicality; replicability; reliability; and overall suitability of the framework for use in Nigeria. The evaluation instrument (questionnaire) was divided into two sections. The first section contains purpose, background and information of the respondent. The other section comprises validation aspect. Thus, the respondents were asked to rate their extent of satisfaction for each of the six validation aspect, based on a scoring scale from 1-5: Where, 5- Excellent; 4- Above Average; 3- Average; 2- Below Average; and 1- Poor (see Appendix S for details).

8.7.2 **Respondents of the survey**

Table 8.6 indicates the detail background information of respondents for validation of the framework. It reveals a total of nine respondents comprised three each from the public sector, the private sector, and academia. This implies that all the identified potential users of the framework were adequately represented. The academic qualification of the respondents indicates that one (out of nine) respondent has Bachelor Degree (BSc). Six (out of nine) respondents have Master's Degree (MSc). On the other hand, two (out of nine) respondents have PhD in their fields of study. Similarly, the respondents have professional experience ranging from 18-36 years in their various sectors comprising construction industry, active researcher among others (see Table 8.6). Based on the foregoing, it is evident that the respondents have vast experience in PPP and adequate professional expertise. Thus, the validation and evaluation provided by these respondents are reliable and a valid assessment of the newly developed framework.

Table 8.6: Background information of respondents for the validation process

No	Position	Type of organisation	Sector	Qualification	Years of experience	Experience
1	Team leader	PPP office	Public	MSc.	18	Hands-on experience in conducting PPP projects in Lagos state
2	Associate Professor	University	Academics	PhD	19	Active researcher
3	Manager	LSDPC	Public	MSc.	25	Hands-on experience in conducting PPP projects, particularly building/housing projects in Lagos state
4	Manager	Local bank (Skye bank)	Private	BSc.	15	Hands-on experience in financing PPP projects in Nigeria
5	CEO	Consultant-Project manager	Private	MSc.	24	Hands-on experience in conducting PPP projects in Lagos state
6	Senior Manager	Local bank (First bank)	Private	MSc.	18	Hands-on experience in financing PPP projects in Nigeria
7	Professor	University	Academics	MSc.	36	Active researcher
8	Manager	NPA (Procurement Unit)	Public	MSc.	24	Hands-on experience in conducting PPP projects and contract administration in Nigeria
9	Professor & Dean of a Faculty	University	Academics	PhD & LLM (Law)	24	Active researcher

8.7.3 **Result of the validation and evaluation**

Table 8.7 indicates the result obtained from the validation exercise. In which the respondents were asked to rate the framework based on the aforementioned six validation parameters

using Likert scale 1-5, where 1 represents poor and 5 represents excellent (see Table 8.7). Based on the results of survey, it is evident that "degree of comprehensiveness" of the framework has the highest mean score value of 4.11 among the six validation criteria adopted in evaluating the framework (see Table 8.7). This implies that the framework is very thorough and rigorous. Also, "overall suitability of the framework in PPP projects in Nigeria" was rated second with mean score value of 4.00; this means that the framework offers a useful guide and provide roadmaps for process improvement in PPP projects implementation. Table 8.7 further indicates that all the six validation criteria have mean score values ranging from 3.67 to 4.11; this implies that all the respondents considered the framework very satisfactory in each of the six validation criteria. Thus, it can be concluded that the newly developed capability enhancement framework was validated to be comprehensive, objective, practical, replicable, reliable, and suitable for use by stakeholder organisations in PPP projects implementation in Nigeria.

Table 8.7: Result of the framework validation

Validation criteria	Scoring scale 1 (Poor) – 5 (Excellent)									Mean score
	Respondent									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
1. Degree of comprehensiveness	4	5	4	4	4	4	3	4	5	4.11
2. Degree of objectivity	4	4	3	4	4	4	3	3	4	3.67
3. Degree of practicality	4	3	3	5	4	4	4	4	3	3.78
4. Degree of replicability	4	4	3	5	4	5	2	3	3	3.67
5. Overall reliability	4	4	4	4	4	4	3	4	4	3.89
6. Overall suitability	4	4	3	4	4	4	5	4	4	4.00

8.8 Chapter summary

The newly developed stakeholder organisations capability enhancement framework (SOCEF) for PPP projects implementation in Nigeria has been presented in this chapter. Also, the results of validation exercise of the framework were also presented. Further, the views of the respondents on the six validation criteria comprised comprehensiveness; objectivity; practicality; replicability; reliability; and suitability of the framework were further presented in this chapter.

Chapter 9: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This thesis developed a stakeholder organisation capability enhancement framework (SOCEF) for PPP projects implementation in Nigeria. In developing the framework, a comprehensive literature review, questionnaire survey, expert forum, and six case studies (including structured interviews, personal observation, and review of documentary evidence in each case study) were conducted. Data were collected and analysed as presented in chapter 6 and chapter 7. In this chapter, the research objectives and methods employed in achieving these objectives were reviewed. This chapter further presents the major findings from the analysis conducted in the previous chapters. Similarly, similarities and differences between these findings were discussed. In the same vein, limitations of this study are highlighted and appropriate recommendations are proposed. This chapter concludes with possible areas for further research.

9.2 Review of research objectives

As earlier mentioned in chapter one of this thesis, this study has sought to answer pertinent questions:

- How can critical success factors that are peculiar to the successful realisation and delivering of PPP infrastructure projects be identified?
- How can capability maturity levels for stakeholder organisations involved in PPP infrastructure projects be determined?

In this regard, this research study aimed to develop stakeholder organisations capability enhancement framework (SOCEF) for PPP infrastructure projects in Nigeria. To achieve this aim, the research is therefore driven by the main eight objectives that are to:

1. explore the development of PPP concepts for infrastructure delivery;
2. review capability maturity model (CMM) dynamics in construction industry;
3. identify and evaluate the drivers and barriers of PPP infrastructure projects implementation in Nigeria;
4. evaluate success factors applicable for PPP infrastructure projects in Nigeria;
5. develop a conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria;

6. determine critical success factors and capability level definitions for stakeholder organisations in PPP infrastructure projects in Nigeria;
7. develop final stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects in Nigeria; and
8 validate the developed final framework.

The aforementioned research objectives were achieved by information obtained from a comprehensive literature review, questionnaire survey, six PPP case studies (including structured interviews, personal observation, and review of documentary evidence within each case study) and expert forum as described in Chapter 5 & 8. Table 9.1 presents the tools employed in achieving these objectives as presented on the next page.

Table 9.1: Tools employed in achieving the research objectives

Tools for data collection	**Objectives**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Explore the development of PPP concepts for infrastructure delivery	Review capability maturity model (CMM) dynamics in construction industry	Identify and evaluate the drivers and barriers of PPP infrastructure projects implementation in Nigeria	Evaluate success factors applicable for PPP infrastructure projects in Nigeria	Develop a conceptual framework for stakeholder organisations capability enhancement in PPP infrastructure projects in Nigeria	Determine critical success factors and capability level definitions for stakeholder organisations in PPP infrastructure projects in Nigeria	Develop final stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects in Nigeria	Validate the developed final framework
Literature review	✓	✓	✓	✓	✓		✓	
Pilot study			✓	✓				
Questionnaire survey			✓	✓				✓
Case studies					✓	✓	✓	✓
Expert forum					✓			✓

9.3 Summary of findings

The major findings emanating from this study are summarised under two broad headings as follows: (i) findings emerging from the review of extant literature; and (ii) findings based on the systematic procedures followed in the conduct of the study and the specific objectives of the study.

9.3.1 **Research findings emerging from extant literature reviewed**

The summary of the results arising from the review of extant literature are as follows:
PPPs have received much attention in the development and financing of public infrastructure facilities and services in the last decade due to its inherent benefits and are now used in over 40 countries. Thus, the growth of PPPs has, in many countries increased the availability of resources, the efficiency, and sustainability of the public services especially in transport, energy, water, telecommunications, and health. In Nigeria, the infrastructure deficit is huge, mainly physical and social infrastructure comprising roads, rails, airports, seaports, and power (electricity). Therefore, in line with global trends, both the federal and state government of Nigeria ameliorating the key infrastructure challenges through the involvement of the private sector in infrastructure development via PPPs. This has led to over 51 infrastructure projects undertaken through PPPs between 1990 and 2009. In 2013 and 2014, about 66 PPP projects were in the pipeline (ICRC, 2014).

Despite the increasing adoptions of PPPs for infrastructure projects in Nigeria, the experiences of stakeholders, particularly the local and foreign private investors are not always positive due to controversies, failures, delays, revocation of concessions agreement among others that characterised its successful implementation. Thereby slow down the implementation and even diminish the interests of the private sector in the Nigerian PPP market. This is supported by the findings of Jefferies *et al*. (2002), Leiringer (2003), Yuan *et al*. (2009), and Yang *et al*. (2010).

There are a number of models used to establish the maturity of a system. For instance, in the construction industry CMM, SPICE, P3M3, P2MM among others (see Table 2.2 for details) were identified as maturity models applied to project management with a view to improving productivity and attains quality gains. It is therefore established in this study that there are limited contributions of these maturity models to PPP infrastructure projects implementation improvement.

The identification of critical success factors (CSFs) has been viewed as the first significant step towards the development of a workable and efficient PPP protocol. Thus, it can be deduced that the success or failure of any PPP project is largely dependent on the country's maturity in each CSF and the relevance of the particular success factor to the country's particular context. Thus, it is established in this study that the approach of using CSFs to develop maturity models has many champions. This assertion is corroborated by some earlier researchers (see Niazi *et al.*, 2003; Fortune & White, 2006; Deloitte, 2007; Yeo & Ren, 2009). It is evident that studies on CSFs to develop maturity models abound, but contributions to PPP projects process maturity are limited. In the same vein, it is also established in this study that studies on CSFs for PPP projects abound, but approaches of using these CSFs to develop PPP process maturity received scarce attention.

9.3.2 Identification and evaluation of the drivers and barriers of PPP infrastructure projects implementation

9.3.2.1 Drivers for adopting PPPs for infrastructure projects

In term of overall mean score ranking of the drivers (see Table 6.3 in Chapter 6), the results found that the top six ranked drivers for adopting PPPs in Nigeria are: invoking discipline-private sector has more discipline for translating strategic intent into actions; invoking private sector skills, experience, access to technology, and innovation; better value for money; better risk allocation/sharing; accelerate infrastructure provision; and improve maintainability respectively. The overall top six ranked drivers for adopting PPPs in Nigeria fall within top five drivers for adopting PPPs in other countries identified by earlier researchers. For instance, Li (2003) identifies risk transfer as one of top five drivers of PPPs in the UK. Chan *et al*. (2009) identify facilitate creative and innovative approaches and risk transfer among the top five drivers of PPPs in Hong Kong. Cheung *et al*. (2009) identify improve maintainability as one of most top five drivers of PPPs in Australia. Similarly, some earlier researchers opined that value for money is the principal justification for PPPs. For example, Li *et al*. (2005a) state that value for money and risk allocation/sharing are major drivers of PPPs in the UK, which were ranked as third and fourth respectively in Nigeria.

It is further revealed that the overall mean score values for all the identified 17 drivers as rated by respondents' ranging from 3.46 to 4.39. Therefore, it can be deduced that the entire 17 drivers are crucial for adopting PPP for infrastructure projects in Nigeria. This can be connected with the massive infrastructure deficit that can be speedily improved, delivered, and optimised through private sector involvement via PPPs.

The Kruskal-Wallis test was conducted to determine whether there is a significant difference in the perception of respondents in the ranking of 17 identified drivers at a significance level of 5%. Based on the results of Kruskal-Wallis test (see Table 6.3 in Chapter 6), there is a statistically significant difference in the perception of respondents on 4 (out of 17) identified drivers. These 4 drivers include: invoking discipline-private sector has more discipline for translating strategic intent into actions, better value for money, better risk allocation/sharing, and improve buildability.

Factor analysis using principal factor extraction with varimax rotation was conducted on the identified 17 drivers for adopting PPPs for infrastructure projects. The result of analysis grouped the 17 identified drivers into 5 principal interpretable factors with their components. The 5 principal factors are innovation and efficiency gains, strengthening public infrastructure, delivering to time and cost, construction and operational performance, and engender accountability in fund utilisation.

9.3.2.2 Barriers to PPP infrastructure projects implementation

The analysis of the ranking of barriers produced the mean score values for the 61 identified barriers ranging from 3.15 to 4.26, this indicates that all the identified barriers were considered by respondents as important barriers influencing PPP infrastructure projects in Nigeria (see Table 6.4 in Chapter 6 for details). The results further revealed that 16 (out of 61) identified barriers have mean score values between 4.00 and 4.26, and the remaining 45 barriers have mean score values between 3.15 and 3.97. It is, therefore, necessary to list out the most ranked 16 barriers that displayed mean score values ranging from 4.00 to 4.26. This includes potential conflicts of interests among the stakeholders; politicisation of the concessions/political interference in procurement process; uncertainty of political environment/political instability; lack of transparency and accountability; poor financial projections and access to funds; inability of local institutions to provide long-term financing/equity financing; perceptions of a country/nation as high risk economy by foreign investors; difficulties in securing credit facility from banks; poor evaluation, monitoring, and due diligence by public sector; weak /poor enabling policies; inadequate consultation with stakeholders to create greater acceptance of PPPs; lack of strong political commitment for PPPs; public resentment due to tariff increases; weak/poor regulatory frameworks and enforcement; poor understanding of PPPs by politician/decision makers; and lengthy delays in negotiation/ delays due to lengthy bureaucratic procedures.

These findings are similar to earlier studies (see Li *et al*., 2005b; Chan *et al.*, 2006; Corbett & Smith, 2006; El-Gohary *et al.*, 2006; Chan *et al.*, 2010). But these study findings are different to very few previous studies on barriers to PPP projects. For instance, KPMG (2010) identified lack of competition; and procurement inefficiencies as barriers to PPPs in Australia among others. Therefore, it can be deduced that there are many barriers to PPP projects implementation in Nigeria and probably in developing countries compared to developed countries.

The results of Kruskal-Wallis test revealed a statistically significant difference on 18 (out of 61) identified barriers (see Table 6.4 in Chapter 6 for details). This is not surprising considering the variations in the conditions of respective PPP projects implementation in Nigeria.

The results of the principal component analysis (PCA) conducted on 61 identified barriers to PPP projects implementation grouped the 61 identified barriers into 10 principal factors with their components (see Table 6.10 for details). The 10 principal factors were interpreted to include: public and private partners' capacity deficiencies, weak political willingness and administrative bottleneck, weak economic conditions and environmental-related problems, social-related problems, corruption and inadequate governmental actions in PPPs, low social acceptability, legal and regulatory-related problems, poor internal and external stakeholders' relationships, delay and politicisation of the concessions, and absence of competition and due diligence (see Table 6.10 for details).

9.3.2.3 Evaluation of success factors for PPPs infrastructure project delivery

The findings revealed that the mean score values for all the identified 26 success factors (SFs) are very high. This implies that the entire 26 identified SFs are important for successful implementation of PPP projects in Nigeria. Thus, the overall ranking indicated the top six ranked SFs for PPP projects in Nigeria as follows: transparency in the procurement process; effective management control; good governance; project economic viability; favourable investment environment; and project technical feasibility (see Table 6.5 for details). These study findings are similar to other notable earlier researchers on SFs for PPP projects. For instance, Tiong (1996) identifies project technical feasibility as one of top six SFs for PPP projects. Jefferies *et al.* (2002) identify transparency in the procurement process as one of top three SFs for BOOT stadium project in Australia. Qiao *et al.* (2001) identify good governance, effective management control, and favourable investment

environment among eight identified SFs for BOT projects in China. Zhang (2005b) identifies favourable investment environment as one of five main SFs for PPPs in infrastructure development. On the other hand, the top six ranked SFs identified in this study does not fall within the top five ranked SFs determined by Li *et al.* (2005c) in the UK and top five ranked SFs identified by Cheung *et al.* (2012a) in Mainland China and Hong Kong. These findings justify the uniqueness characteristics of PPP to a particular country, where the structure, culture, and maturity of concerned stakeholder organisations in PPP projects are different.

The results of Kruskal-Wallis test indicated that except for 6 (out of 26) identified SFs; there was no statistically significant difference in the perceptions of respondents on SFs for PPP projects in Nigeria (see Table 6.5 for details). This is not surprising considering the variations in the conditions of respective PPP projects.

The result through factor analysis, grouped the 26 identified SFs into six principal factors. The factors include: reliable concession arrangement with due diligence; serious commitment to adequate technical strength; favourable economic environment; government support for enabling legislation; bankable project with adequate stakeholders involvement; and strong 'political will' with committed private partners (see Table 6.11 for details).

In achieving the overall aim of this study, the 26 identified success factors for PPP projects were retained for further investigation. The numbers of identified success factors in this study are higher compared to Li (2003) and Cheung (2009) that identify 18 success factors for PPP projects in the UK and China respectively. Also, the identified 26 success factors were further classified based on their characteristics into PESTLE (Political; Economic; Social; Technological; Legal; and Environmental). The choice of PESTLE in this study was informed that success factors for PPP projects are influenced either positively or negatively by PESTLE. Therefore, success factors master-list was generated (see Table 6.12 for details).

9.3.3 Assessment of criticality of the identified 26 success factors in 'physical infrastructure/civil and engineering' PPP project case studies: using FMEA technique

The assessment of the criticality of identified 26 success factors using FMEA technique under physical infrastructure PPP project case studies (case study 1-3) comprised: (i) the concession of Lekki-Epe Expressway (road); (ii) concession of Muritala Mohammed Airport

(MMA2); and (iii) concession of seaports (see Table 7.12 in Chapter 7). The analysed data revealed that:

10 (out of 26) success factors were identified as critical success factors (CSFs) that made the concession of Lekki-Epe Expressway (i.e. case study 1) attained the level of success it's achieved. These 10 CSFs are: government involvement by providing guarantees, political support, availability of suitable and adequate financial market, project economic viability, appropriate risk allocation and risk sharing, appropriate project identification, thorough and realistic assessment of the cost and benefits, strong and good private consortium, technical innovation and technology transfer, and favourable legal framework (see Table 7.12 and Appendix I for full details).

4 (out of 26) success factors were identified as CSFs in the concession of Muritala Mohammed Airport (i.e. case study 2). This includes: government involvement by providing guarantees, political support, availability of suitable and adequate financial market, and project economic viability (see Table 7.12 and Appendix J for details).

8 (out of 26) success factors were identified as CSFs in the concession of seaports (i.e. case study 3). These include: government involvement by providing guarantees, political support, competitive procurement process, transparency in the procurement process, project economic viability, commitment and responsibility of public and private sectors, appropriate risk allocation and risk sharing, and strong and good private consortium(see Table 7.12 and Appendix K for details).

9.3.4 **Assessment of criticality of the identified 26 success factors in PPP social infrastructure/building project case studies: using FMEA technique**

In the same vein, the assessment of the criticality of identified 26 success factors using FMEA technique under social infrastructure PPP project case studies (i.e. case study 4-6) comprised: concession of Emerald hostel at University of Lagos, concession of Kanti towers modern office complex, and concession of Tejuosho ultra-modern shopping complex (see Table 7.13 in Chapter 7). The analysed data revealed that:

The CSFs that responsible for the degree of success attained in the concession of Emerald hostel at University of Lagos (i.e. case study 4) are: project economic viability, appropriate

project identification, and strong and good private consortium (see Table 7.13 and Appendix L for details).

The results of FMEA on criticality of the identified success factors in the concession of Kanti towers modern office complex (case study 5) revealed project technical feasibility, appropriate project identification, and thorough and realistic assessment of the cost and benefits as 3 CSFs that made the concession project achieved the level success being attained (see Table 7.13 and Appendix M for details).

The CSFs in the concession of Tejuosho ultra-modern shopping complex (case study 6) includes project economic viability, appropriate project identification, and thorough and realistic assessment of the cost and benefits (see Table 7.13 and Appendix N for details).

9.3.5 CSFs emanating from case studies

Based on the results of assessment of the criticality of identified success factors using FMEA in the six PPP case studies as previously discussed, the following are revealed:

The study identified a total of 13 CSFs under the physical infrastructure PPP projects (i.e. case study 1-3) that made these PPP projects attained various degrees of success (see section 7.7 in Chapter 7 for full details).

The study further identified a total of 5 CSFs under the social infrastructure PPP projects (i.e. case study 4-6) that responsible for various levels of success in these PPP projects (see section 7.7 in Chapter 7 for full details).

The identified CSFs in both the physical and social infrastructure PPP projects case studies aforementioned were filtered to generate a total list of 14 CSFs that made PPP infrastructure projects successful in Nigeria (see Table 7.14 in Chapter 7 for details).

9.3.6 Developing stakeholder organisations capability enhancement framework (SOCEF) suitable for use in PPP project implementation in Nigeria

The success of any PPP project is largely dependent on the country's maturity in each CSF and the relevance of the particular success factor to the country's particular context. Thus, the main contribution of this research, therefore, is better understanding of CSFs to develop PPP process maturity in PPP infrastructure projects in Nigeria. This research adopted the concept of CMM with respect to CSFs that made PPP projects successful in Nigeria, to develop a stakeholder organisations capability enhancement framework. Also, drawing on

the theoretical analysis and the findings from quantitative and qualitative research strands, the framework was developed (see section 8.3-8.6 in Chapter 8). The framework is comprised stakeholders, capability maturity matrix, and CSFs (see Table 8.2 and Table 8.3 for details).

The newly developed framework was employed to assess the current capability maturity levels of stakeholder organisations involved in PPP infrastructure projects implementation in Nigeria on 14 CSFs identified in this study (see section 8.6 in Chapter 8, Table 8.5, Figure 8.1 and Figure 8.2 for full details). Thus, the framework provides roadmap for improvements by indicating 'what' needs to be done in achieving higher capability maturity levels on each CSF applicable to both the public and private sector organisations in PPP infrastructure projects in Nigeria. Therefore, as presented in section 8.4 of chapter 8, the framework is separated into two: (i) public sector organisations capability enhancement framework in PPP infrastructure projects in Nigeria, and (ii) private sector organisations capability enhancement framework in PPP infrastructure projects in Nigeria (see Table 8.2 & Table 8.3 for details). The overall assessment of the current capability maturity levels of the stakeholder from both the public and private sector organisations on the CSFs (see Table 8.5) revealed that:

Public sector organisations (including ministries, departments, agencies, and local authority) have low capability maturity levels between level 1 (ad hoc) and level 2 (repeatable) on these CSFs. For instance, the public sector organisations were in level 1 (ad hoc) on project technical feasibility, transparency in the procurement process, and appropriate risk allocation and risk sharing with their overall average scores of 1.78, 1.67, and 1.63 respectively. Thus, these scores were equivalent to 35.6%, 33.4%, and 32.6% respectively of the overall total score of 5 points assigned to the maximum point achievable (see Table 8.5 for details). These findings are similar to previous studies that found low maturity level, which is between level 1 and level 2 in all project management knowledge areas for public sector organisations involved in both large infrastructure projects development and in PPP infrastructure projects in South Africa and Botswana among others (see Rwelamila, 2007; Tembo & Rwelamila; 2008; Rwelamila & Phungula, 2009).

Private sector organisations (including concessionaires, local lenders/banks, contractors, and consultants) have capability maturity levels ranging from 2.37 to 3.30 (see Table 8.5 for details), which is level 2 (repeatable) and level 3 (defined). The private sector organisations were in level 3 (defined) on both the project economic viability, and thorough and realistic

assessment of the cost and benefits with their overall average scores of 3.30 and 3.00 equivalents to 66% and 60% of the overall total score of 5 points assigned to the maximum point achievable. While, the private sector organisations were in level 2 (repeatable) on the other CSFs applicable to them (see Table 8.5 for details).

9.4 Contributions of the study

The results that have emanated from this study provided both the theoretical and practical contributions which are described as follows:

9.4.1 Theoretical contributions

This study has made the following theoretical contributions:

1. To the body of knowledge in construction management, the study has provided new insights into the usefulness of CSFs in PPP projects and indicated that merely identifying possible CSFs for PPP projects are not sufficient.

2. Identification of the drivers and barriers to PPP infrastructure projects through an empirical assessment in developing countries, especially in Nigeria. Although there are previous studies, however, there is a dearth of efforts at investigating drivers and barriers to PPPs through an empirical method in Nigeria. Therefore, these study results are valuable to both the potential local and foreign private investors by broadening their awareness of the main drivers for adopting PPPs in developing countries. At the same time, the study results on barriers enable the stakeholders in PPPs recognise significant barriers to the implementation of PPP projects in Nigeria.

3. Understanding and enhancing knowledge of PPPs continue to be a matter of significance and importance. For instance, the scientific research community has shown considerable interest in identifying CSFs for PPP projects. In Nigeria, few studies examined CSFs for PPP projects (e.g. Babatunde *et al*., 2012) failed to discuss the phenomenon from primary stakeholder perspectives. Considering this phenomenon from primary stakeholder perspectives provided a richer and more practical knowledge of CSFs for PPP projects in Nigeria. It is in pursuance of this, that five different primary stakeholder organisations already involved in PPP projects implementation to include the public sector authorities, concessionaires, local

lenders/banks, consultants, and contractors were considered as respondents in this study.

4. Identification of specific CSFs for a particular PPP infrastructure project in Nigeria. This was achieved through a multiple case study approach. Although considerable studies have been conducted on CSFs for PPP projects, very few previous studies were specific in identifying CSFs for a particular PPP infrastructure projects, especially in Nigeria. Therefore, these study results helped PPP stakeholders, particularly primary stakeholders to focus their attention, priorities, and leadership in managing the identified CSFs in achieving value for money.

5. To the methodological body of knowledge within construction management research. The study adopted FMEA technique in determining the criticality of success factors in the six case studies (see section 5.14 in chapter 5 for details). The quantitative data obtained in the six case studies were analysed using FMEA. FMEA has been widely used in manufacturing industry and mechanical engineering. But the application of FMEA method has not received much attention in construction management research and PPP studies. FMEA is a tool that allows for subjective assessment of case study that produces empirical values for statistical analysis. Therefore, researchers can adopt and replicate FMEA method in determining criticality of factors/variables in their future studies both in construction management research and PPP studies.

6. This study has not only made contributions to knowledge in relation to the use of CSFs to develop PPP process maturity framework for stakeholder organisations in PPP projects, but also contributes to the wider body of knowledge of process improvement in the construction industry.

9.4.2 **Practical contributions**

1. A stakeholder organisation's capability enhancement framework (SOCEF) was developed for PPP infrastructure projects in Nigeria. Currently, no such framework exists, and this development is believed to enhance the success of PPP projects implementation in Nigeria, and benefit the construction industry at large, as well as introduce new opportunities.

2. The framework developed in this study had provided a benchmark for the identification of methodical approach and standard to process improvement in PPP

infrastructure projects in Nigeria, and the framework could be used to benchmark future studies.

3. The framework is believed to enable each stakeholder organisation in PPP projects in Nigeria to identify their current state of capability maturity levels in an integral manner, and to compare with other organisations evaluated in the same framework.

4. The framework provided feasible improvement roadmaps that each stakeholder organisation in PPP projects in Nigeria can follow to improve their capability maturity levels and thus guarantee long-term success of PPP projects implementation in Nigeria.

9.5 Conclusions

The success of any PPP project is largely dependent on the country's maturity on each critical success factor (CSF) and the relevance of the particular CSF to the country's particular context. Thus, understanding of CSFs to develop process maturity in PPP infrastructure projects is imperative with a view to providing a methodical approach and standard to process improvement in PPP projects. This research, therefore, adopted the concept of Capability Maturity Models (CMMs) with respect to CSFs that made PPP infrastructure projects successful in Nigeria, to develop a stakeholder organisations' capability enhancement framework (SOCEF) for PPP infrastructure projects in Nigeria. The research identified 14 CSFs that made PPP infrastructure projects successful in Nigeria. These include: government involvement by providing guarantees; political support; competitive procurement process; transparency in the procurement process; availability of suitable and adequate financial market; project economic viability; commitment and responsibility of public and private sectors; appropriate risk allocation and risk sharing; appropriate project identification; technical innovation and technology transfer; thorough and realistic assessment of the cost and benefits; project technical feasibility; strong and good private consortium; and favourable legal framework. These CSFs were employed for capability maturity levels definition ranging from level 1(Ad hoc) to level 5(Optimising) following CMM concept. This has led to the development of stakeholder organisations capability enhancement framework (SOCEF) in PPP infrastructure projects implementation in Nigeria. The framework was used in assessing the current capability maturity levels of stakeholder organisations involved in PPP infrastructure projects on 14 CSFs identified in

this study. The findings revealed that public sector organisations were between capability maturity level 1 and capability maturity level 2 (out of 5 maturity levels) on each CSF applicable to them. While private sector organisations were mostly in maturity level 2 on each CSF associated with them. It can be established that Nigeria's stakeholder organisations maturity are between maturity level 1 and maturity level 2 (out of 5 maturity levels) on CSFs that made PPP infrastructure projects successful.

It is believed that the framework would offer a useful guide, and providing roadmaps for improvement by indicating 'what' needs to be done in achieving higher capability maturity levels on each CSF applicable to both the public and private sector organisations in PPP infrastructure projects in Nigeria. Therefore, the framework developed had provided a benchmark for the identification of methodical approach and standard to process improvement in PPP infrastructure projects in Nigeria. This would be beneficial to PPP stakeholders within and outside Nigeria by enhancing the success rate of PPP infrastructure projects. The findings emanated from this research prove to be more reliable as they come about not merely from a secondary data but rather from field work approach that involved getting stakeholders shared their genuine practical experiences.

9.6 Recommendations

Based on the findings of this research, the following recommendations are proposed:

- There is an urgent need for the development of PPP project process maturity culture. It is recommended that both the public and private sector organisations in PPP projects in Nigeria should realise the importance of integrating maturity models to the project management in their organisational culture.

- Since both the public and private sector organisations are in low capability maturity levels, it is, therefore, required of the stakeholder organisations in PPP projects implementation to undertake a broad improvement programs in achieving higher capability maturity levels. It is also recommended that once the improvement programmes are implemented, they need to be assessed to see whether they are effective.

- Stakeholder's capacity building on PPPs in Nigeria should be enhanced including training, workshops and conferences for public sector employees in Infrastructure Concession Regulatory Commission (ICRC), Ministries, Departments, and Agencies

(MDAs), Bureau of Public Enterprises (BPE), Bureau of Public Procurement (BPP) and National Planning Commission (NPC) in terms of planning, project appraisal, procurement, contract and project management, financial modelling, project whole life costing and risk management to broaden their PPPs knowledge. It is recommended that the Nigerian governments must fundamentally improve their systems for dealing with the private sector to realise the efficiency and effectiveness gains that partnerships promise.

- It is established in this research that many barriers are influencing PPP projects implementation in Nigeria. It is therefore recommended that all the stakeholders in the Nigerian PPP market recognise the identified barriers in this research and develop strategies to eliminate them. This will allow the partnerships to function effectively and ensuring successful implementation of PPPs in Nigeria.

- The CSFs identified in this research are used to establish a baseline to develop a maturity process in PPP project. Thus, it is recommended that these CSFs require the constant and careful attention of stakeholders' management in achieving organisation performance goals and to guarantee the long-term success of PPP infrastructure projects implementation in Nigeria.

- It is finally recommended that the stakeholders in the Nigerian PPP market are encouraged to apply the framework with the user guide (see Appendix T) developed in this research.

The researcher is of the opinion that if the stakeholder organisations in PPP infrastructure projects implementation in Nigeria act upon the findings and recommendations of this research, it will enhance the success rate of PPP projects in Nigeria.

9.7 Limitations of the research

The main conditions that could limit the applicability or generalisation of the findings of this research to the other developing countries are as follows:

- The peculiarity features of PPPs to a particular country, where the structure, culture, and maturity of concerned stakeholder organisations in PPP projects are different. Therefore, generalisability of these research findings across the developing countries is considered as a limitation.

- The case study findings particularly on CSFs from the 6 PPP case studies were data using FMEA technique. The results could be enhanced in future work, using other valuable analysis in determining the criticality of success factors in PPP case studies.

- Currently, no such framework developed in this research exists for process improvement in PPP projects. Thus, the accuracy needs improvement in future work.

- The capability enhancement framework developed in this research is currently designed for stakeholder organisations in PPP infrastructure projects. Therefore, limiting the use of the framework to PPP projects only.

9.8 Areas for further research

Some of the findings in this research provided possible directions for further research in the following areas:

- The capability enhancement framework developed in this research should be further refined using other maturity models applied to project management in the construction industry such as: Organisational Project Management Maturity Model (OPM3), Portfolio, Programme and Project Management Maturity Model (P3M3), PRINCE 2 Maturity Model (P2MM), Standardised Process Improvement for Construction Enterprises(SPICE) among others.

- Further research should be conducted to widening the understanding of CSFs to develop PPP project process maturity in different countries, using a comparative approach.

- There should be further study to investigate the maturity of stakeholder organisations on CSFs for PPP infrastructure projects in other locations.

- Further study should be conducted to develop a web interface for the framework developed in this research. This would increase the usage of the framework and make it easy for the users.

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APPENDICES

Appendix A: General questionnaire survey

27 February 2014

Dear Sir/Madam,

Developing Public Private Partnerships Strategy for Infrastructure Delivery in Nigeria

The above research aims to develop a stakeholder capability enhancement framework for PPP infrastructure projects in Nigeria. Your assistance in completing this questionnaire to the best of your knowledge and ability is therefore needed so that the objectives of the research can be achieved. It can be assured that your responses shall be strictly used for research purposes and shall be treated with absolute confidentiality. If you are interested to have the summary of our report at the end of the study, we shall be delighted to send you a copy, do indicate your email address in the background information section of the questionnaire.

Thanks in anticipation.

Yours Sincerely

Signed

Solomon Olusola Babatunde
(PhD Research Student)

Prof. Srinath Perera (Principal Supervisor)
Dr Chika Udeaja (2nd Supervisor)
Dr Lei Zhou (3rd Supervisor)

SECTION A: RESPONDENTS PROFILE

1. Category of your firm/organisation in PPPs project.
   (a) Public Sector Authorities (MDAs) ☐ (b) Private Investor/Concessionaire ☐
   (c) Lender/Financial (Bank) ☐ (d) Consultant ☐ (e) Contractor ☐

2. Highest academic qualification(s) of respondent.
   (a) HND ☐ (b) B.Tech/BSc ☐ (c) M.Tech/MSc ☐ (d) PhD ☐
   (e) Others, please specify…….

3. How many years of industrial/professional experience do you have.
   (a) 5 years or below ☐ (b) 6 – 10 years ☐ (c) 11 – 15 years ☐ (d) 16 – 20 years ☐
   (e) Above 21 years ☐

4. Have you been involved in PPP procurement system?
(a) Yes ☐ (b) No ☐ **(if No, please go to question 7)**

5. How many PPP projects have you or your firm/organisation been involved in?
(a) 1 ☐ (b) 2 ☐ (c) 3 ☐ (d) 4 ☐ (e) 5 ☐ (f) Above 5 ☐

6 Which of the following PPP projects have you or your firm/organisation been involved with (You may tick more than one box)?
(a) University Hostel ☐ (b) Housing & Office ☐ (c) Roads ☐ (d) Airports ☐
(e) Seaports ☐ (f) Hospitals ☐ (g) Rails ☐ (h) Power & Energy ☐
(i) Water & Sanitary ☐ (j) Markets Complex ☐ (k) IT & Communication ☐
Others, please specify…….

7 If you are interested to have the summary of our report at the end of the study, please provide your email address……..

SECTION B

8. Please rate the following identified drivers for adopting PPPs for infrastructure project. Based on a scale of 1 – 5, where 5–Very Important, 4–Important, 3–Moderately Important, 2–Of Little Importance, and 1–Unimportant

Drivers for adopting PPP for infrastructure project	**5**	**4**	**3**	**2**	**1**
1. Better risk allocation/sharing					
2. Better value for money					
3. Faster implementation					
4. Improved quality of service					
5. Accelerate infrastructure provision					
6. Better incentives to perform					
7. Enhanced public management					
8. Generate additional revenues					
9. Reduced whole life costs					
10. Solve the problem of public sector budget constraints					
11. Invoking private sector skills, experience, access to technology, and innovation					
12. Invoking discipline: private sector has more discipline for translating strategic intent into actions					
13. Improve buildability					
14. Improve maintainability					
15. Resolve problems of corruption in public procurement					
16. *Resolve problems of inefficiencies in traditional procurement*					
17. Address short political tenures (government rush)					

Drivers for adopting PPP for infrastructure project	5	4	3	2	1
Others, please specify below and rate					

5–Very Important, 4–Important, 3–Moderately Important, 2–Of Little Importance, and 1–Unimportant

9. Please rate the following factors that contribute to the success of PPP infrastructure projects. Based on a scale of 1 – 5, where 5–Most Significant, 4–More Significant, 3–Significant, 2–Less Significant, 1–Not Significant

Factors that contribute to the success of PPP projects	**5**	**4**	**3**	**2**	**1**
1. Transparency in the procurement process					
2. Competitive procurement process					
3. Good governance					
4. Well organized and committed public agency					
5. Social support					
6. Shared authority between public and private sectors					
7. Thorough and realistic assessment of the cost and benefits					
8. Favourable legal framework					
9. Project technical feasibility					
10. Appropriate risk allocation and risk sharing					
11. Commitment and responsibility of public and private sectors					
12. Strong and good private consortium					
13. Government involvement by providing a guarantee					
14. Multi – benefits objectives					
15. Political support					
16. Stable macroeconomic conditions					
17. Sound economic policy					
18. Availability of suitable and adequate financial market					
19. Technical innovation and technology transfer					
20. Effective management control					
21. Consultation with end-users					
22. Appropriate project identification					

Factors that contribute to the success of PPP projects	5	4	3	2	1
23. Clear project brief and client requirements					
24. Project economic viability					
25. Favourable investment environment					
26. Good partners' relationship					
Others, please specify below and rate					

5–Most Significant, 4–More Significant, 3–Significant, 2–Less Significant, and 1–Not Significant

10. Please rate the following identified barriers that contribute to the failure of PPP projects. Based on a scale of 1 – 5, where 5– Most Significant, 4 – More Significant, 3 – Significant, 2 – Less Significant, 1 – Not Significant

Barriers that contribute to the failure of PPP projects	5	4	3	2	1
1. Inadequate consultation by stakeholders to create greater acceptance of PPPs					
2. Potential conflicts of interests among the stakeholders					
3. Public sector inability to manage consultants					
4. Cultural impediments include behaviours of people towards PPPs					
5. Public opposition/Public resistance					
6. Lack of confidence and mistrust in PPPs					
7. Fear over the implications of decisions made					
8. Societal discontent against the private sector					
9. Low trust between public and private sector					
10. Lack of governmental assistance in resolving conflicts arising from toll charges					
11. Public resentment due to tariff increases.					
12. Weak /poor enabling policies					
13. Weak/poor regulatory frameworks and enforcement					
14. Problems of administrative procedures and guidelines					
15. Non availability of model concession agreements					
16. Weak institutional capacity and PPPs strategy					
17. Weak judicial framework/weak judiciary for resolving PPP disputes					
18. Law and regulation changes					
19. Low credibility of government policies.					

Barriers that contribute to the failure of PPP projects	5	4	3	2	1
20. Lack of public sector project development funds to promote PPPs					
21. Inability of local institutions to provide long term financing/equity financing					
22. Difficulties in securing credit facility from banks					
23. Problems of delays in receiving payments					
24. Perceptions of a country/nation as high risk economy by foreign investors					
25. Difficulty in obtaining foreign exchange/foreign exchange risk					
26. Perceived rise in tariffs					
27. Macroeconomic fluctuations in currency or purchasing power					
28. Inadequate domestic capital markets					
29. Land acquisition problems					
30. Lack of coordination between national and regional governments					
31. Lack of PPPs enabling environment					
32. Lack of transparency and accountability					
33. Lengthy delays in negotiation/ Delays due to lengthy bureaucratic procedures					
34. Poor coordination between different public sector departments					
35. Accusations of corruption and corrupt tendencies					
36. Lack of independence of regulatory body					
37. Lack of completion in procurement procedures					
38. Political reneging					
39. Poor understanding of PPPs by politician/decision makers					
40. Distortions of guarantees/incentives by governments					
41. Lengthy delays due to political debate					
42. Uncertainty of political environment/political instability					
43. Politicization of the concessions/Political interference in procurement process					
44. Incapability of government to manage PPP projects					
45. lack of strong political commitment for PPPs					
46. Complex decision making					
47. Lack of capacity in public sector to develop and manage PPP process					
48. PPP process not clearly defined/lack of clarity					
5– Most Significant, 4 –More Significant, 3 – Significant, 2 – Less Significant, and 1 – Not Significant					

Barriers that contribute to the failure of PPP projects	5	4	3	2	1
investing in a very large number of PPP projects					
50. Difficulty in specifying work requirements and the quality of service					
51. Lack of experience and expertise in both public sector and private investors					
52. Inconsistent risk assessment and management/Poor risk management					
53. Provision of incomprehensive up-front project information by public sector					
54. Shortage of professionals to handle PPP projects					
55. Unavailability of large construction companies to deliver PPP projects					
56. Lack of innovations in design					
57. Lack of flexibility					
58. Inefficiencies and management blunders of the concessionaire					
59. Poor evaluation, monitoring and due diligence by public sector					
60. Non-competitive bidding					
61. poor financial projections and access to funds					

5– Most Significant, 4 –More Significant, 3 – Significant, 2 – Less Significant, and 1 – Not Significant

Thank you for your time

Appendix B: Total variance explained on 17 identified drivers

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.783	28.136	28.136	4.783	28.136	28.136	2.681	15.771	15.771
2	1.661	9.773	37.909	1.661	9.773	37.909	2.338	13.751	29.522
3	1.477	8.691	46.600	1.477	8.691	46.600	2.007	11.807	41.329
4	1.381	8.125	54.725	1.381	8.125	54.725	1.915	11.266	52.595
5	1.196	7.036	61.760	1.196	7.036	61.760	1.558	9.165	61.760
6	.978	5.752	67.512						
7	.805	4.734	72.246						
8	.704	4.139	76.385						
9	.690	4.061	80.446						
10	.622	3.659	84.105						
11	.566	3.328	87.433						
12	.478	2.813	90.245						
13	.426	2.508	92.753						
14	.392	2.309	95.062						
15	.341	2.007	97.069						
16	.260	1.532	98.601						
17	.238	1.399	100.000						

Extraction Method: Principal Component Analysis.

Appendix C: Rotated component matrix [a] on 17 identified drivers

Ref. code	Component				
	1	2	3	4	5
F1/DR05	.795				
F1/DR11	.740				
F1/DR12	.598				
F1/DR16	.587				
F1/DR01	.537				
F1/DR10	.504				
F2/DR02		.814			
F2/DR03		.747			
F2/DR04		.699			
F3/DR09			.708		
F3/DR07			.699		
F3/DR06			.533		
F3/DR08			.426		
F4/DR13				.720	
F4/DR14				.637	
F5/DR17					.779
F5/DR15					.665

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 6 iterations

Appendix D: Total variance explained on 61 identified barriers

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.328	30.046	30.046	18.328	30.046	30.046
2	3.604	5.908	35.954	3.604	5.908	35.954
3	3.119	5.113	41.067	3.119	5.113	41.067
4	2.711	4.445	45.512	2.711	4.445	45.512
5	2.376	3.896	49.407	2.376	3.896	49.407
6	2.164	3.547	52.955	2.164	3.547	52.955
7	1.867	3.060	56.015	1.867	3.060	56.015
8	1.686	2.764	58.779	1.686	2.764	58.779
9	1.607	2.634	61.413	1.607	2.634	61.413
10	1.536	2.517	63.930	1.536	2.517	63.930
11	1.522	2.495	66.425			
12	1.334	2.187	68.612			
13	1.280	2.098	70.711			
14	1.167	1.913	72.623			
15	1.059	1.736	74.359			
16	1.009	1.654	76.014			
17	.936	1.534	77.548			
18	.883	1.448	78.996			
19	.837	1.373	80.369			
20	.749	1.229	81.598			
21	.728	1.194	82.791			
22	.707	1.159	83.950			
23	.680	1.115	85.066			
24	.645	1.058	86.124			
25	.612	1.003	87.127			
26	.553	.906	88.033			
27	.534	.876	88.909			
28	.523	.857	89.766			
29	.471	.772	90.538			
30	.450	.738	91.276			
31	.406	.666	91.942			
32	.398	.652	92.594			
33	.368	.604	93.198			
34	.363	.596	93.793			
35	.329	.539	94.333			
36	.309	.506	94.839			
37	.283	.464	95.303			
38	.263	.431	95.734			
39	.244	.400	96.134			
40	.227	.371	96.505			
41	.207	.340	96.845			
42	.204	.335	97.179			
43	.181	.297	97.477			
44	.179	.293	97.770			

45	.156	.256	98.026			
46	.142	.233	98.259			
47	.120	.197	98.456			
48	.116	.191	98.647			
49	.112	.183	98.830			
50	.108	.176	99.006			
51	.093	.153	99.159			
52	.087	.142	99.301			
53	.075	.122	99.423			
54	.066	.109	99.532			
55	.061	.101	99.632			
56	.059	.097	99.730			
57	.045	.074	99.803			
58	.036	.059	99.862			
59	.032	.053	99.915			
60	.029	.048	99.963			
61	.023	.037	100.000			

Extraction Method: Principal Component Analysis.

Appendix E: Rotated component matrix [a] on identified 61 barriers to PPP projects implementation

	Component									
Ref. code	1	2	3	4	5	6	7	8	9	10
F1/BR55	.760									
F1/BR50	.758									
F1/BR56	.723									
F1/BR51	.671									
F1/BR34	.657									
F1/BR57	.651									
F1/BR54	.616									
F1/BR53	.614									
F1/BR49	.546									
F1/BR52	.511									
F1/BR39	.508									
F1/BR47	.466									
F1/BR58	.415									
F1/BR03	.344									
F2/BR45		.690								
F2/BR44		.688								
F2/BR37		.655								
F2/BR14		.381								
F2/BR32		.357								
F3/BR21			.788							
F3/BR22			.739							
F3/BR25			.655							
F3/BR20			.652							
F3/BR24			.606							
F3/BR28			.535							
F3/BR27			.455							
F3/BR61			.450							
F3/BR19			.440							
F3/BR23			.399							
F3/BR29			.342							
F4/BR06				.749						
F4/BR07				.743						
F4/BR05				.692						
F4/BR11				.567						
F4/BR31				.474						
F5/BR35					.822					
F5/BR33					.680					
F5/BR30					.502					
F5/BR38					.495					
F5/BR40					.475					
F5/BR10					.456					
F5/BR12					.429					
F6/BR09						.741				
F6/BR08						.626				

F6/BR16						.620				
F6/BR04						.411				
F7/BR18							.766			
F7/BR17							.552			
F7/BR13							.540			
F7/BR15							.451			
F7/BR36							.447			
F8/BR01								.596		
F8/BR02								.488		
F8/BR26								.433		
F8/BR48								.364		
F9/BR46									.555	
F9/BR41									.526	
F9/BR43									.502	
F9/BR42									.491	
F10/BR60										.763
F10/BR59										.485

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 22 iterations.

Appendix F: Total variance explained on 26 identified success factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.521	28.928	28.928	7.521	28.928	28.928	4.285	16.479	16.479
2	2.376	9.138	38.066	2.376	9.138	38.066	2.982	11.470	27.949
3	1.635	6.287	44.353	1.635	6.287	44.353	2.618	10.070	38.019
4	1.408	5.417	49.770	1.408	5.417	49.770	2.131	8.197	46.216
5	1.385	5.328	55.098	1.385	5.328	55.098	1.940	7.460	53.676
6	1.309	5.035	60.133	1.309	5.035	60.133	1.679	6.457	60.133
7	1.118	4.302	64.435						
8	1.094	4.208	68.643						
9	.998	3.837	72.479						
10	.894	3.439	75.918						
11	.797	3.064	78.982						
12	.713	2.743	81.725						
13	.582	2.237	83.963						
14	.477	1.834	85.796						
15	.462	1.776	87.572						
16	.442	1.699	89.272						
17	.418	1.609	90.881						
18	.382	1.470	92.351						
19	.372	1.429	93.780						
20	.320	1.231	95.011						
21	.273	1.049	96.060						
22	.257	.988	97.048						
23	.245	.942	97.990						
24	.212	.816	98.806						
25	.159	.612	99.418						
26	.151	.582	100.000						

Extraction Method: Principal Component Analysis (PCA)

Appendix G: Rotated component matrix [a] on 26 identified success factors

Ref. code	Component					
	1	2	3	4	5	6
F1/SF01	.797					
F1/SF20	.700					
F1/SF03	.685					
F1/SF04	.662					
F1/SF02	.611					
F1/SF07	.588					
F1/SF22	.496					
F1/SF25	.341					
F2/SF26		.727				
F2/SF11		.696				
F2/SF05		.628				
F2/SF10		.594				
F2/SF19		.489				
F3/SF18			.766			
F3/SF16			.705			
F3/SF17			.634			
F4/SF14				.667		
F4/SF13				.635		
F4/SF08				.533		
F4/SF09				.484		
F5/SF24					.787	
F5/SF23					.653	
F5/SF21					.527	
F6/SF15						.758
F6/SF12						.582
F6/SF06						.491

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 12 iterations.

Appendix H: Case study protocol and FMEA template

Developing Public Private Partnerships Strategy for Infrastructure Delivery in Nigeria

Interview number:

Interview date & time:

Interview location:

SECTION A: Background Information

3. Name of the PPP infrastructure project case study?

   ……..

4. Position of your firm/organisation in the PPP project…….....

5. Your highest academic qualification……...

4. How many years of professional experience do you have?…….

5. How many number of PPP project has firm/organisation involved-in? …..……

SECTION B

The aim of this section is to determine the critical success factors in particular PPP infrastructure project case study in which your firm/organization has involved. The identified factors are classified using PESTLE (Political, Economic, Social, Technological, Legal, and Environmental). Please, use the following FMEA ranking criteria to score the identified factors according to their **Occurrence (O), Severity (S), and Detection (D).**

Occurrence (O)	Ranking	Severity (S)	Ranking	Detection (D)	Ranking
Very high	10	Critical impact	10	Almost impossible to detect & control	10
Almost very high	9	Almost critical impact	9	Very remote to detect & control	9
High	8	Very high impact	8	Remote to detect & control	8
Moderately high	7	High impact	7	Very low to detect & control	7
Moderate	6	Moderate impact	6	Low to detect & control	6
Moderately low	5	Low impact	5	Moderate to detect & control	5
Low	4	Very low impact	4	Moderately high to detect & control	4
Very low	3	Minor impact	3	High to detect & control	3
Remote	2	Very minor impact	2	Very high (almost certain to detect& control	2
Negligible	1	Negligible impact	1	Very high (certain to detect & control	1

6. Scoring the identified factors based on the ranking criteria above during the interviews by interviewer

PESTLE classification of success factors in PPP infrastructure projects

PESTLE classification of success factors to PPPs	**Occurrence (O)**	**Severity (S)**	**Detection (D)**
Political			
Government involvement by providing guarantees			
Political support			
Good governance			
Competitive procurement process			
Transparency in the procurement process			
Economic			
Availability of suitable and adequate financial market			
Favourable investment environment			
Project economic viability			
Stable macroeconomic conditions			
Sound economic policy			
Social			
Commitment and responsibility of public and private sectors			
Good partners' relationship			
Consultation with end-users			
Social support			
Shared authority between public and private sectors			
Technological			
Appropriate risk allocation and risk sharing			
Effective management control			
Project technical feasibility			
Clear project brief and client requirements			
Appropriate project identification			
Technical innovation and technology transfer			
Thorough and realistic assessment of the cost and benefits			
Strong and good private consortium			
Legal			
Favourable legal framework			
Environmental			
Well organized and committed public agency			
Multi-benefits objectives			

Thank you for your time

Appendix I: FMEA results for the concession of Lekki-Epe Expressway

Success factors/Ref. coding	Public				Private				Total	
	O	S	D	RPN	O	S	D	RPN	Aver. RPN	Remark
Political										
Government involvement by providing guarantees/PO/F4/SF13	10	9	9	810	10	10	8	800	805	Critical
Political support/PO/F6/SF15	9	9	8	648	10	10	9	900	774	Critical
Good governance/PO/F1/SF03	10	7	8	560	6	10	8	480	520	Somehow Critical
Competitive procurement process/PO/F1/SF02	8	7	6	336	9	8	7	504	420	Less Critical
Transparency in the procurement process/PO/F1/SF01	5	8	6	240	8	8	7	448	344	Less Critical
Economic										
Availability of suitable and adequate financial market/EC/F3/SF18	10	9	8	720	9	10	9	810	765	Critical
Favourable investment environment/EC/F1/SF25	9	8	9	648	9	10	8	720	684	Somehow Critical
Project economic viability/EC/F5/SF24	10	9	8	720	10	10	9	900	810	Critical
Stable macroeconomic conditions/EC/F3/SF16	6	6	5	180	8	5	7	280	230	Not Critical
Sound economic policy/EC/F3/SF17	7	6	6	252	6	8	7	336	294	Less Critical
Social										
Commitment and responsibility of public and private sectors/SO/F2/SF11	7	8	7	392	9	9	8	648	520	Somehow Critical
Good partners' relationship/SO/F2/SF26	7	6	6	252	9	8	7	504	378	Less Critical
Consultation with end-users/SO/F5/SF21	5	5	4	100	2	7	9	126	113	Not Critical
Social support/SO/F2/SF05	6	6	5	180	4	10	8	320	250	Less Critical
Shared authority between public and private sectors/SO/F6/SF06	8	7	6	336	7	6	7	294	315	Less Critical
Technological										
Appropriate risk allocation and risk sharing/TE/F2/SF10	10	10	8	800	10	9	9	810	805	Critical
Effective management control/TE/F1/SF03	9	7	8	504	9	10	8	720	612	Somehow Critical
Project technical feasibility/TE/F4/SF09	10	9	8	720	9	9	8	648	684	Somehow Critical
Clear project brief and client requirements/TE/F5/SF23	9	8	7	504	8	7	6	336	420	Less Critical
Appropriate project identification/TE/F1/SF22	10	10	8	800	10	9	8	720	760	Critical
Technical innovation and technology transfer/TE/F2/SF19	10	9	8	720	10	9	9	810	765	Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	10	10	8	800	9	10	9	810	805	Critical
Strong and good private consortium/TE/F6/SF12	9	10	8	720	10	10	8	800	760	Critical
Legal										
Favourable legal framework/LE/F4/SF08	9	9	8	648	9	10	10	900	774	Critical
Environmental										
Well organized and committed public agency/EN/F1/SF04	8	5	6	240	7	8	4	224	232	Less Critical
Multi-benefits objectives/EN/F4/SF14	6	6	5	180	8	7	7	392	286	Less Critical

Appendix J: FMEA results for the concession of MMA 2

Success Factors	Public				Private				Total	
	O	S	D	RPN	O	S	D	RPN	Aver. RPN	Remark
Political										
Government involvement by providing guarantee/PO/F4/SF13	10	9	8	720	9	10	9	810	765	Critical
Political support/PO/F6/SF15	10	9	8	720	10	10	9	900	810	Critical
Good governance/PO/F1/SF03	6	5	4	120	7	6	6	252	186	Not Critical
Competitive procurement process/PO/F1/SF02	2	8	2	32	4	7	5	140	86	Not Critical
Transparency in the procurement process/PO/F1/SF01	1	8	1	08	3	9	2	54	31	Not Critical
Economic										
Availability of suitable and adequate financial market/EC/F3/SF18	9	10	9	810	10	10	9	900	855	Critical
Favourable investment environment/EC/F1/SF25	9	9	9	729	9	8	9	648	689	Somehow Critical
Project economic viability/EC/F5/SF24	10	9	9	810	10	9	8	720	765	Critical
Stable macroeconomic conditions/EC/F3/SF16	6	5	4	120	7	8	7	392	256	Less Critical
Sound economic policy/EC/F3/SF17	4	6	4	96	7	6	5	210	153	Not Critical
Social										
Commitment and responsibility of public and private sectors/SO/F2/SF11	6	7	6	252	9	7	7	441	231	Not Critical
Good partners' relationship/SO/F2/SF26	3	5	5	75	5	7	6	210	143	Not Critical
Consultation with end-users/SO/F5/SF21	1	7	1	07	2	8	4	64	36	Not Critical
Social support/SO/F2/SF05	5	5	6	150	4	9	6	216	183	Not Critical
Shared authority between public and private sectors/SO/F6/SF06	4	3	3	36	5	5	6	150	93	Not Critical
Technological										
Appropriate risk allocation and risk sharing/TE/F2/SF10	3	6	8	144	5	7	7	245	195	Not Critical
Effective management control/TE/F1/SF03	2	8	6	96	5	9	7	315	206	Not Critical
Project technical feasibility/TE/F4/SF09	8	7	7	392	6	9	7	378	385	Less Critical
Clear project brief and client requirements/TE/F5/SF23	3	7	3	63	5	6	4	120	92	Not Critical
Appropriate project identification/TE/F1/SF22	10	9	9	810	10	9	8	720	765	Not Critical
Technical innovation and technology transfer/TE/F2/SF19	4	6	5	120	5	8	7	280	200	Not Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	7	7	6	294	8	9	8	576	435	Less Critical
Strong and good private consortium/TE/F6/SF12	8	7	8	448	9	8	9	648	548	Somehow Critical
Legal										
Favourable legal framework/LE/F4/SF08	2	6	5	60	4	7	6	168	114	Not Critical
Environmental										
Well organized and committed public agency/EN/F1/SF04	6	7	7	294	5	6	7	210	252	Less Critical
Multi-benefits benefits/EN/F4/SF14	4	6	6	144	6	8	7	336	240	Not Critical

Appendix K: FMEA results for the concession of Seaports

Success Factors	Public				Private				Total	
	O	S	D	RPN	O	S	D	RPN	Aver. RPN	Remark
Political										
Government involvement by providing guarantees/PO/F4/SF13	9	10	8	720	10	10	8	800	760	Critical
Political support /PO/F6/SF15	10	10	9	900	9	10	8	720	810	Critical
Good governance/PO/F1/SF03	7	8	6	336	9	8	6	432	384	Less Critical
Competitive procurement process/PO/F1/SF02	10	9	9	810	10	9	8	720	765	Critical
Transparency in the procurement process/PO/F1/SF01	10	10	8	800	9	10	8	720	760	Critical
Economic										
Availability of suitable and adequate financial market/EC/F3/SF18	7	9	7	441	9	8	6	432	218	Not Critical
Favourable investment environment/EC/F1/SF25	10	8	8	640	9	9	7	567	604	Somehow Critical
Project economic viability/EC/F5/SF24	10	9	9	810	10	9	8	720	765	Critical
Stable macroeconomic conditions/EC/F3/SF16	8	8	6	384	9	8	8	576	480	Less Critical
Sound economic policy/EC/F3/SF17	7	8	5	280	8	7	6	336	308	Less Critical
Social										
Commitment and responsibility of public and private sectors/SO/F2/SF11	10	9	8	720	9	10	9	810	765	Critical
Good partners' relationship/SO/F2/SF26	8	7	5	280	7	7	6	294	574	Somehow Critical
Consultation with end-users/SO/F5/SF21	6	6	5	180	4	7	5	140	160	Not Critical
Social support/SO/F2/SF05	7	6	8	336	6	6	7	252	294	Less Critical
Shared authority between public and private sectors/SO/F6/SF06	6	8	9	432	7	7	6	294	363	Less Critical
Technological										
Appropriate risk allocation and risk sharing/TE/F2/SF10	9	10	9	810	10	10	8	800	805	Critical
Effective management control/TE/F1/SF03	8	9	7	504	9	8	9	648	576	Somehow Critical
Project technical feasibility/TE/F4/SF09	8	9	8	576	8	9	9	648	612	Somehow Critical
Clear project brief and client requirements/TE/F5/SF23	8	7	6	336	9	8	6	432	384	Less Critical
Appropriate project identification/TE/F1/SF22	9	7	7	441	8	9	7	504	473	Less Critical
Technical innovation and technology transfer/TE/F2/SF19	8	9	7	504	9	9	8	648	576	Somehow Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	9	9	7	567	9	9	8	648	608	Somehow Critical
Strong and good private consortium/ TE/F6/SF12	10	9	9	810	10	10	8	800	805	Critical
Legal										
Favourable legal framework/LE/F4/SF08	7	10	9	630	8	10	8	640	635	Somehow Critical
Environmental										
Well organized and committed public agency/EN/F1/SF04	8	8	6	384	6	7	8	336	360	Less Critical
Multi-benefits objectives/EN/F4/SF14	6	7	6	252	7	6	5	210	231	Not Critical

Appendix L: FMEA results for the concession of Emerald Hostel

Success Factors	Public				Private				Total	
	O	S	D	RPN	O	S	D	RPN	Aver. RPN	Remark
Political										
Government involvement by providing guarantees/PO/F4/SF13	5	4	4	80	4	6	5	120	100	Not Critical
Political support/PO/F6/SF15	9	8	9	648	7	8	6	336	492	Less Critical
Good governance/PO/F1/SF03	7	8	7	392	5	5	7	175	284	Less Critical
Competitive procurement process/PO/F1/SF02	4	5	6	120	2	4	4	32	76	Not Critical
Transparency in the procurement process/PO/F1/SF01	3	5	6	90	3	5	4	60	75	Not Critical
Economic										
Availability of suitable and adequate financial market/EC/F3/SF18	9	10	7	630	10	8	8	640	635	Somehow Critical
Favourable investment environment/EC/F1/SF25	9	9	8	648	10	8	9	720	684	Somehow Critical
Project economic viability/EC/F5/SF24	10	8	9	720	10	10	8	800	760	Critical
Stable macroeconomic conditions/EC/F3/SF16	6	7	5	210	7	8	6	336	273	Less Critical
Sound economic policy/EC/F3/SF17	5	6	8	240	6	6	7	252	246	Not Critical
Social										
Commitment and responsibility of public and private sectors/SO/F2/SF11	8	7	8	448	7	8	6	336	392	Less Critical
Good partners' relationship/SO/F2/SF26	6	8	6	288	7	6	5	210	249	Not Critical
Consultation with end-users/SO/F5/SF21	5	7	7	245	7	8	6	336	291	Less Critical
Social support/SO/F2/SF05	6	5	6	180	4	6	7	168	174	Not Critical
Shared authority between public and private sectors/SO/F6/SF06	8	6	5	240	7	8	6	336	288	Less Critical
Technological										
Appropriate risk allocation and risk sharing/TE/F2/SF10	8	10	7	560	6	8	6	288	424	Less Critical
Effective management control/TE/F1/SF03	7	8	8	448	8	6	7	336	392	Less Critical
Project technical feasibility/TE/F4/SF09	10	8	7	560	9	9	8	648	604	Somehow Critical
Clear project brief and client requirements/TE/F5/SF23	10	7	6	420	7	7	6	294	714	Somehow Critical
Appropriate project identification/ TE/F1/SF22	10	9	9	810	10	8	9	720	765	Critical
Technical innovation and technology transfer/TE/F2/SF19	4	5	5	100	7	6	6	252	176	Not Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	8	9	7	504	7	8	7	392	448	Less Critical
Strong and good private consortium/ TE/F6/SF12	9	10	8	720	10	9	9	810	765	Critical
Legal										
Favourable legal framework/LE/F4/SF08	6	5	5	150	4	6	5	120	135	Not Critical
Environmental										
Well organized and committed public agency/EN/F1/SF04	8	7	6	336	5	7	8	280	308	Less Critical
Multi-benefits objectives/EN/F4/SF14	6	6	7	252	5	6	7	210	231	Not Critical

Appendix M: FMEA results for the concession of Kanti towers

Success Factors	Public				Private				Total	
	O	S	D	RPN	O	S	D	RPN	Aver. RPN	Remark
Political										
Government involvement by providing guarantees/PO/F4/SF13	6	8	6	288	5	5	9	225	257	Less Critical
Political support/PO/F6/SF15	5	7	7	245	4	4	8	128	187	Not Critical
Good governance/PO/F1/SF03	7	9	5	315	5	5	7	175	245	Not Critical
Competitive procurement process/PO/F1/SF02	2	7	9	126	5	7	7	245	186	Not Critical
Transparency in the procurement process/PO/F1/SF01	1	8	9	72	3	9	8	216	144	Not Critical
Economic										
Availability of suitable and adequate financial market/EC/F3/SF18	9	9	8	648	10	9	8	720	684	Somehow Critical
Favourable investment environment/EC/F1/SF25	6	9	4	216	6	7	8	336	276	Less Critical
Project economic viability/EC/F5/SF24	8	10	6	480	8	8	7	448	464	Less Critical
Stable macroeconomic conditions/EC/F3/SF16	4	8	3	96	5	5	6	150	123	Not Critical
Sound economic policy/EC/F3/SF17	5	8	4	160	4	7	6	168	164	Not Critical
Social										
Commitment and responsibility of public and private sectors/SO/F2/SF11	8	7	2	112	4	6	4	96	104	Not Critical
Good partners' relationship/SO/F2/SF26	7	8	5	280	5	5	4	100	190	Not Critical
Consultation with end-users/SO/F5/SF21	7	9	8	504	8	8	7	448	476	Less Critical
Social support/SO/F2/SF05	8	4	5	160	4	4	6	96	128	Not Critical
Shared authority between public and private sectors/SO/F6/SF06	8	7	5	280	5	4	4	80	180	Not Critical
Technological										
Appropriate risk allocation and risk sharing/TE/F2/SF10	5	8	6	240	3	5	7	105	173	Not Critical
Effective management control/TE/F1/SF03	3	6	7	126	4	4	8	128	127	Not Critical
Project technical feasibility/TE/F4/SF09	9	10	9	810	10	9	8	720	765	Critical
Clear project brief and client requirements/TE/F5/SF23	10	8	9	720	9	9	8	648	684	Somehow Critical
Appropriate project identification/ TE/F1/SF22	9	10	9	810	10	8	9	720	765	Critical
Technical innovation and technology transfer/TE/F2/SF19	9	7	6	378	9	8	7	504	441	Less Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	10	10	8	800	9	10	9	810	805	Critical
Strong and good private consortium/ TE/F6/SF12	6	8	7	336	8	7	7	392	364	Less Critical
Legal										
Favourable legal framework/LE/F4/SF08	8	7	6	336	7	5	7	245	291	Less Critical
Environmental										
Well organized and committed public agency/EN/F1/SF04	7	7	6	294	5	8	6	240	267	Less Critical
Multi-benefits objectives/EN/F4/SF14	9	4	6	216	8	5	7	280	248	Not Critical

Appendix N: FMEA results for the concession of Tejuosho market

Success Factors	Public				Private				Total	
	O	S	D	RPN	O	S	D	RPN	Aver. RPN	Remark
Political										
Government involvement by providing guarantees/PO/F4/SF13	6	7	7	294	4	8	5	160	227	Not Critical
Political support/PO/F6/SF15	9	6	7	378	8	9	9	648	513	Somehow Critical
Good governance/PO/F1/SF03	5	7	6	210	7	8	6	336	273	Less Critical
Competitive procurement process/PO/F1/SF02	4	5	8	160	3	3	6	54	107	Not Critical
Transparency in the procurement process/PO/F1/SF01	4	7	6	168	5	3	7	105	137	Not Critical
Economic										
Availability of suitable and adequate financial market/EC/F3/SF18	8	8	7	448	9	8	8	576	512	Somehow Critical
Favourable investment environment/EC/F1/SF25	6	6	4	144	7	6	5	210	177	Not Critical
Project economic viability/EC/F5/SF24	9	10	8	720	10	9	9	810	765	Critical
Stable macroeconomic conditions/EC/F3/SF16	7	8	6	336	8	7	7	392	364	Less Critical
Sound economic policy/EC/F3/SF17	6	8	7	336	8	7	5	280	308	Less Critical
Social										
Commitment and responsibility of public and private sectors/SO/F2/SF11	7	9	8	504	9	9	8	648	576	Somehow Critical
Good partners' relationship/SO/F2/SF26	7	8	7	392	8	9	9	648	520	Somehow Critical
Consultation with end-users/SO/F5/SF21	5	8	6	240	6	8	7	336	288	Less Critical
Social support/SO/F2/SF05	5	8	7	280	7	8	8	448	364	Less Critical
Shared authority between public and private sectors/SO/F6/SF06	8	10	6	480	7	9	7	441	461	Less Critical
Technological										
Appropriate risk allocation and risk sharing/TE/F2/SF10	8	8	6	384	7	10	7	490	437	Less Critical
Effective management control/TE/F1/SF03	9	8	7	504	7	9	6	378	441	Less Critical
Project technical feasibility/TE/F4/SF09	8	9	7	504	6	9	9	486	495	Less Critical
Clear project brief and client requirements/TE/F5/SF23	9	9	6	486	8	9	9	648	567	Somehow Critical
Appropriate project identification/ TE/F1/SF22	9	10	8	720	10	10	8	800	760	Critical
Technical innovation and technology transfer/TE/F2/SF19	5	7	6	210	6	6	5	180	195	Not Critical
Thorough and realistic assessment of the cost and benefits/TE/F1/SF07	10	9	9	810	9	10	8	720	765	Critical
Strong and good private consortium/ TE/F6/SF12	7	8	7	392	8	9	9	648	520	Somehow Critical
Legal										
Favourable legal framework/LE/F4/SF08	6	6	7	252	8	8	9	576	414	Less Critical
Environmental										
Well organized and committed public agency/EN/F1/SF04	6	9	7	378	5	8	6	240	309	Less Critical
Multi-benefits objectives/EN/F4/SF14	5	5	7	175	3	6	6	108	142	Not Critical

Appendix O: Cover letter

17 July 2014

Developing Public Private Partnership Strategy for Infrastructure Delivery in Nigeria

Dear Sir,

Thank you for agreeing to participate in the expert forum.

The aim of this doctoral research is to develop a stakeholder organisation capability enhancement framework for PPP infrastructure projects in Nigeria. In order to achieve the aim, Capability Maturity Model (CMM) concept has been adopted using identified success factors revealed through questionnaire survey that responsible for successful implementation of PPP projects in Nigeria. Success factors were used to define capability maturity levels for stakeholder organisation in PPPs from level 1(Ad hoc) to level 5(Optimizing).

The main purpose of this expert forum is to invoke refinement to this framework before taking it to the field (case studies). Please provide any additional comments for each level in the framework. **All information provided will be treated in the strictest of confidence.**

Find the following attachments:

1: Cover letter

2: Instructions

3: Capability maturity levels characteristics

4: Draft framework

5: Editing document

Please return the **editing document** through email by **Monday 18 August 2014**. If you require any additional information, please do not hesitate to contact me by email.

Thank you again for your assistance.

Yours Sincerely
Signed
Solomon Olusola Babatunde
Email: solomon.babatunde@northumbria.ac.uk
Mobile No: +44(0)7405221653

Appendix P: Instructions

(Please read all the instructions)

1. As a participant of this expert forum, your comments/response will be treated in the strictest of confidence.

2. Carefully read capability maturity levels characteristics. This will provide insight on peculiarities of each maturity level (i.e. level 1 to level 5). It contains 5 pages, each page contain characteristics of each maturity level.

3. Read the draft framework carefully, you can print it to facilitate the reading. The framework was developed using success factors in PPPs. Thus, stakeholder organisation capability levels were defined from Level 1(Ad hoc) to level 5(Optimizing) for each success factor.

4. After reading the framework, go to editing document. There are two columns section for each maturity level, the first one indicates "Agree (A)" and the other one indicates "Not Agree (NA)". If you are agree or not agree with the statement in each maturity level (1-5) insert/type "A" or "NA" in appropriate column provided.

5. Please go to comment section column in the same row of editing document, if you have indicated "NA" (Not Agree) on any maturity level 1 to level 5. The comment section was numbered 1-5, where 1- represents maturity level 1 and 5- represent maturity level 5. Please make your comment(s) on appropriate level(s) you have indicated "NA" (Not Agree).

6. The editing document is prepared on spreadsheet (Excel). So you can comment as many as possible.

7. Please provide any additional comments that can improve the framework.

8. Please return the "editing document" by **Monday 18 August 2014**.

9. Please if you require any additional information do not hesitate to contact me by email.

Thanks for your time

Appendix Q: Assessment tool for public sector organisation current capability maturity levels in PPP infrastructure projects

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Project identification	No formal process for PPP projects identification. Project identification success depends on individual efforts.	Project identification process is developed. Process is planned and executed in accordance with policy. Trainings are provided and repeated.	Standard process and procedures for project identification are established. Standard process is used to establish consistency across the organisation. Process is more rigorous and managed proactively. Tools and database are in place.	Tools and database enable strategic analysis of project identification. Predictions are based in part, on a statistical analysis. Performance reporting.	Appropriate project identification is achieved. Standard process and procedures are continuously improved. Processes are kept up to date, seizing opportunities when circumstances change.
Score	☐	☐	☐	☐	☐
	1. No proven process. 2. Process is chaotic. 3. Unable to repeat success. 4. Process group to bootstrap the process is established. 5. Project success depends on individual efforts. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. There is plan for performing the process. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Trainings are provided. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Quality and process performance objectives are established. 2. Capture lessons learned and feedback. 3. Continually improving process performance through innovative process and technological improvement. 4. Strong project driven and flexible. 5. Leverage good relationship with other stakeholders. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Project technical feasibility	No understanding of the importance of project technical feasibility to PPP project outcomes. No project technical feasibility tools in use.	Organisation's overall strategy is being developed. Organisation has a clear and measurable strategy to project technical feasibility, but no process is in place to align the strategy with other relevant PPP partners.	Organisation's strategy is more proactive and aligned with relevant PPP partners. Tools and database are in place.	Tools and database enable strategic analysis done in alignment with the strategy of other partners. Strategies are regularly and formally reviewed with input from other stakeholders.	Project technical feasibility with due diligence is achieved. Organisation has develop strategic alliances, institutional arrangement, and partnering with external stakeholders. Regular use of lessons learned and feedback to inform project technical feasibility strategies. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Skilled people are employed. 2. Resources are provided. 3. Responsibilities are assigned. 4. Process is controlled and monitored. 5. Trainings are provided 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more rigorous and proactive 5. Tools and database are in place. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Quantitative objectives are established. 2. Tools and database are in use for statistical analysis. 3. Process is controlled using statistical and other quantitative techniques. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Develop societal network and community relations. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Assessment of the cost and benefits	No formal processes or practices are available. No tools are in use for assessment of the cost and benefits. The success depends on individual efforts.	Formal processes are developed. Commitments are established among relevant stakeholders. Skilled personnel to produce controlled outputs are employed.	Standard processes and procedures are established. Processes are more rigorous and proactive. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Thorough and realistic assessment of cost and benefits is achieved. Organisation is focusing on performance improvement of processes by using sophisticated tools for both qualitative and quantitative analysis with robust interpretations. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Process is performed but exceeds the budget and schedule. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Project economic viability	No understanding of project economic viability. No tools and database in place. Projects success depends on individual efforts.	Project economic viability process is established and planned. Trainings and resources are provided.	Organisation established standard project economic viability process and procedures, and improved over time. Processes are more rigorous and managed proactively. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Organisation focuses on performance improvement of project economic viability process by using both qualitative and quantitative analysis to generate a robust interpretation. Regular use of lessons learned and feedback loop in place to inform project economic viability strategies. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Competitive procurement process	No attempt to recognize the importance of competitive procurement process. No tools and database in use.	Recognition of the importance of competitive procurement process. Organisation ensured that the process is planned and executed in accordance to policy, but no standard process established.	Organisation established standard process and improved over time. Process is more rigorous and managed proactively. Tools and database are in place.	Process is regularly and formally reviewed with input from other stakeholders. Using sophisticated tools for quantitative analysis. Conduct post project reviews.	Competitive procurement is achieved. Competitive procurement process is continuously improved and performance optimized. Using sophisticated tools for both qualitative and quantitative analyses with robust interpretations. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Transparency in the procurement process	Unaware of the need for transparency in the procurement process. Project success depends on individual efforts.	Recognition of the importance of transparency in the procurement process. Process is monitored and evaluated for adherence to project descriptions.	Standard process is used to establish consistency across the organisation. Process is more rigorous and proactive. Tools and database are in place.	Process performance is collected and statistically analysed. Conduct post project reviews.	Transparency in the procurement is achieved. Organisation continually improves the process. Capture lessons learned and feedback loop in place. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support the process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Process is performed but exceeds the budget and schedule. 1 2 3 4 5 ☐	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5 ☐	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5 ☐	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5 ☐	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5 ☐
Risk allocation and risk sharing	Little understanding of the importance of risk allocation and risk sharing. Project success attributed to skills of individuals within the organisation. No risk management tools and database in use. ☐	Recognition of the importance of risk allocation and risk sharing in PPPs. Simple template and spreadsheet are used for some activities. ☐	Risk allocation and sharing process is defined. Well-established template and software tools are in place. ☐	Risk allocation and sharing process is rigorous and proactive. The process is regularly and formally reviewed with input from other stakeholders. Using sophisticated software tools for statistical analysis. Predictions are based in part on statistical analysis. ☐	Appropriate risk allocation and risk sharing to the best party to manage it effectively and efficiently is achieved in PPPs implementation. The risk allocation and sharing process is continually improved using sophisticated software tools for both qualitative and quantitative analyses. ☐

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
	1. No stable environment to support the process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5
Commitment and responsibility of public and private sectors **Score**	No attempt to recognize the importance of commitment and responsibility of public and private sectors. ☐	Recognition of the importance of commitment and responsibility of public and private sectors. Commitments are established among relevant stakeholders. Process is emerging. ☐	Standard processes are established and revised over time. Processes are more rigorous and managed proactively. Tools and database are in place. ☐	Processes performance is collected and statistically analysed. Conduct post project reviews. ☐	Strong commitment and responsibility of public and private sectors is achieved. Public and private organisations are continually improving performance through incremental and innovative process and technological improvement. Develop societal network and community relations. Regular use of lessons learned and feedback loop in place. ☐

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
	1. Unaware of the need for the process. 2. No proven process. 3. Process is chaotic. 4. Unable to repeat success. 5. Process group is established to bootstrap the process. 1 2 3 4 5	1. The process is introduced. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed. 1 2 3 4 5	1. Standard processes are established. 2.Reasonably high teamwork 3. Processes are improved over time. 4. Processes are more rigorous and proactive 5. Tools and database are in place. 1 2 3 4 5	1. Quantitative objectives for quality and process performance are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4.Organisational flexibility and willingness for change 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both qualitative and quantitative analysis for process improvement. 4. Capture lessons learned and feedback. 5. Leverage good relationship with other stakeholders, and develop societal network and community relations. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Legal framework	Unaware of the need for legal framework towards PPPs. Little interest in establishing legal framework.	Legal framework is being developed but no PPPs special laws.	Legal framework and PPP special laws are well defined and described in standards and procedures. Pockets of best practice evident.	Legal framework and PPP special laws are regularly and formally reviewed with input from other stakeholders.	Favourable legal framework achieved. Continually focussing on improvement in line with international best practices. Process kept up-to-date and measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. Process is chaotic. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. The process is developed. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed. 1 2 3 4 5	1. Standard process is established. 2. Process is improved over time. 3. Process is more rigorous and proactive 4. Pockets of best practice evident. 5. Task orientation management. 1 2 3 4 5	1. Quantitative objectives for quality and process performance are established. 2. Specific measures of process performance are collected and statistically analysed. 3. Process is aligned to organisation's strategic objectives and priorities 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both qualitative and quantitative analysis for process improvement. 4. Enlightened leadership and management style. 5. Leverage good relationship with other stakeholders, and develop societal network and community relations. 1 2 3 4 5
Political support **Score**	Lip-service by political leaders in supporting PPP projects. Project success depends on individual efforts. ☐	Recognition the importance of political support to PPPs. ☐	Strong recognition of the importance of political support to PPPs. Pockets of best practice evident. ☐	Process is regularly and formally reviewed with input from other stakeholders. ☐	Political support achieved. Continually improving process performance through innovative process. Regular use of lessons learnt from international best practices and feedback loop in place to inform the satisfaction of political support for PPPs project. ☐

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. The process is introduced. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed. 1 2 3 4 5	1. Standard process is established. 2. Process is improved over time. 3. Process is more rigorous and proactive 4. Pockets of best practice evident. 5. Task orientation management. 1 2 3 4 5	1. Means for improvement are established. 2. Quantitative objectives for quality and process performance are established. 3. Organisational flexibility and willingness for change 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both qualitative and quantitative analysis for process improvement. 4. Enlightened leadership and management style. 5. Leverage good relationship with other stakeholders, and develop societal network and community relations. 1 2 3 4 5
Financial market **Score**	No attempt to recognize the importance of suitable and adequate financial market to PPPs implementation. The financial market is chaotic. 1. No stable environment to support process. 2. No proven process. 3. Process is chaotic. 4. No tools and database in place 5. Project success depends on individual efforts.	Recognition of the importance of suitable and adequate financial market to achieving successful PPPs. 1. The process is introduced. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders	Strong recognition of the significant of availability of suitable and adequate financial market to PPP implementation. Tools and database are in place. 1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in	Establishing quantitative objectives for quality and process performance. Predictions are based in part on a statistical analysis. 1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders.	Availability of suitable and adequate financial market for PPPs achieved. Using sophisticated tools for both qualitative and quantitative analyses with robust interpretations of financial market. 1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, department, agencies and local authorities
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
		5. Commitments are revised as needed. 1 2 3 4 5	place. 1 2 3 4 5	5. Strong teamwork, even with external partners. 1 2 3 4 5	performance through incremental and innovative process. 1 2 3 4 5
Government involvement by providing guarantees	Government unaware of the need to provide guarantee in achieving successful PPP outcomes.	Government recognizes the importance of their involvement by providing guarantee to private investors in PPPs.	Government strongly recognizes significant of their involvement by providing guarantee of different forms to private investors in PPPs implementation. Pockets of best practice evident.	Government using quantitative technique to determine appropriate guarantee to be provided for private investors in PPPs implementation. Predictions of appropriate guarantee are based in part on statistical analysis.	Government continually improving on the quantitative and qualitative approach of providing guarantee for private investors in PPPs. The framework for government involvement in providing guarantees to private investors in PPP project is established. Measurable benefits.
Score					
	1. No stable environment to support process. 2. No proven process. 3. Process is chaotic. 4. No tools and database in place 5. Project success depends on individual efforts 1 2 3 4 5	1. The process is introduced. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

Appendix R: Assessment tool for private sector organisation current capability maturity levels in PPP infrastructure projects

CSFs	Capability maturity levels			Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)	
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Project technical feasibility	No understanding of the importance of project technical feasibility to PPP project outcomes. No project technical feasibility tools in use.	Organisation's overall strategy is being developed. Organisation has a clear and measurable strategy to project technical feasibility, but no process is in place to align the strategy with other relevant PPP partners.	Organisation's strategy is more proactive and aligned with relevant PPP partners. Tools and database are in place.	Tools and database enable strategic analysis done in alignment with the strategy of other partners. Strategies are regularly and formally reviewed with input from other stakeholders.	Project technical feasibility with due diligence is achieved. Organisation has develop strategic alliances, institutional arrangement, and partnering with external stakeholders. Regular use of lessons learned and feedback to inform project technical feasibility strategies. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Skilled people are employed. 2. Resources are provided. 3. Responsibilities are assigned. 4. Process is controlled and monitored. 5. Trainings are provided 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more rigorous and proactive 5. Tools and database are in place. 1 2 3 4 5	1. Quantitative objectives are established. 2. Tools and database are in use for statistical analysis. 3. Process is controlled using statistical and other quantitative techniques. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Develop societal network and community relations. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Assessment of the cost and benefits	No formal processes or practices are available. No tools are in use for assessment of the cost and benefits. The success depends on individual efforts.	Formal processes are developed. Commitments are established among relevant stakeholders. Skilled personnel to produce controlled outputs are employed.	Organisation established standard processes and procedures. Processes are more rigorous and proactive. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Thorough and realistic assessment of cost and benefits is achieved. Organisation is focusing on performance improvement of processes by using sophisticated tools for both qualitative and quantitative analysis with robust interpretations. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Process is performed but exceeds the budget and schedule. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Project economic viability	No understanding of project economic viability. No tools and database in place. Projects success depends on individual efforts.	Project economic viability process is established and planned. Trainings and resources are provided.	Organisation established standard project economic viability process and procedures, and improved over time. Processes are more rigorous and managed proactively. Tools and database are in place.	Tools and database are used to produce quantitative results. Predictions are based in part, on a statistical analysis.	Organisation focuses on performance improvement of project economic viability process by using both qualitative and quantitative analysis to generate a robust interpretation. Regular use of lessons learned and feedback loop in place to inform project economic viability strategies. Measurable benefits.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Financial market	No attempt to recognize the importance of suitable and adequate financial market to PPPs implementation. The financial market is chaotic.	Recognition of the importance of suitable and adequate financial market to achieving successful PPPs.	Strong recognition of the significant of availability of suitable and adequate financial market to PPP implementation. Tools and database are in place.	Establishing quantitative objectives for quality and process performance. Predictions are based in part on a statistical analysis.	Availability of suitable and adequate financial market for PPPs is established. Using sophisticated tools for both qualitative and quantitative analyses with robust interpretations of financial market.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. Process is chaotic. 4. No tools and database in place 5. Project success depends on individual efforts. 1 2 3 4 5	1. The process is introduced. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Risk allocation and risk sharing	Little understanding of the importance of risk allocation and risk sharing. Project success attributed to skills of individuals within the organisation. No risk management tools and database in use.	Recognition of the importance of risk allocation and risk sharing in PPPs. Simple template and spreadsheet are used for some activities.	Risk allocation and sharing process is defined. Well-established template and software tools are in place.	Risk allocation and sharing process is rigorous and proactive. The process is regularly and formally reviewed with input from other stakeholders. Using sophisticated software tools for statistical analysis. Predictions are based in part on statistical analysis.	Appropriate risk allocation and risk sharing to the best party to manage it effectively and efficiently is achieved in PPPs implementation. The risk allocation and sharing process is continually improved using sophisticated software tools for both qualitative and quantitative analyses.
Score					
	1. No stable environment to support the process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Strong and good private consortium	Difficulty in managing new and competing demands. Project success depends on individual efforts.	Weak team orientation and organisation good at doing repetitive works.	Reasonably high team orientation. Task orientation management.	Strong teamwork, even with external partners. Organisational flexibility and willingness for change and adaptive leadership.	Strong and good private consortium with vast skilled personnel, experienced and capable project team. Strong project-driven organisation that is dynamic and flexible. Strong organisational learning to facilitate innovation and generate new ideas. Enlightened leadership and develop strategic alliances, institutional arrangement, and partnering with external stakeholders.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. There is a plan for performing. 2. Resources are provided. 3. Responsibilities are assigned. 4. Skilled people are employed. 5. Commitments are established among relevant stakeholders. 1 2 3 4 5	1. Standard processes are established. 2.Reasonably high teamwork 3. Processes are improved over time. 4. Processes are more rigorous and proactive 5. Tools and database are in place. 1 2 3 4 5	1. Quantitative objectives for quality and process performance are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Organisational flexibility and willingness for change. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both qualitative and quantitative analysis for process improvement. 4. Capture lessons learned and feedback. 5. Leverage good relationship with other stakeholders, and develop societal network and community relations. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Commitment and responsibility of public and private sectors	No attempt to recognize the importance of commitment and responsibility of public and private sectors.	Recognition of the importance of commitment and responsibility of public and private sectors. Commitments are established among relevant stakeholders. Process is emerging.	Standard processes are established and revised over time. Processes are more rigorous and managed proactively. Tools and database are in place.	Processes performance is collected and statistically analysed. Conduct post project reviews.	Strong commitment and responsibility of public and private sectors is achieved. Public and private organisations are continually improving performance through incremental and innovative process and technological improvement. Develop societal network and community relations. Regular use of lessons learned and feedback loop in place.
Score	☐	☐	☐	☐	☐
	1. Unaware of the need for the process. 2. No proven process. 3. Process is chaotic. 4. Unable to repeat success. 5. Process group is established to bootstrap the process. 1 2 3 4 5	1. The process is introduced. 2. Process is evaluated for adherence to descriptions. 3. Process is controlled and monitored 4. Commitments are established among relevant stakeholders 5. Commitments are revised as needed. 1 2 3 4 5	1. Standard processes are established. 2.Reasonably high teamwork 3. Processes are improved over time. 4. Processes are more rigorous and proactive 5. Tools and database are in place. 1 2 3 4 5	1. Quantitative objectives for quality and process performance are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4.Organisational flexibility and willingness for change 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand process performance. 2. Continually improve on quality and process performance objectives. 3. Using sophisticated tools for both qualitative and quantitative analysis for process improvement. 4. Capture lessons learned and feedback. 5. Leverage good relationship with other stakeholders, and develop societal network and community relations. 1 2 3 4 5

CSFs	Capability maturity levels				Stakeholder: Private sector (including concessionaires, contractors, local lenders/banks and consultants)
	1 **Ad hoc**	**2** **Repeatable**	**3** **Defined**	**4** **Managed**	**5** **Optimizing**
Technical innovation and technology transfer	No attempt to recognize the importance of technical innovation and technology transfer. Project success depends on individuals efforts.	Recognition of the importance of a technical innovation and technology transfer. Trainings are provided.	People capacity and enabling systems required to support technical innovation and technology transfer are in place across the organisation. Tools and database are in place.	Organisation support for technical innovation and technology transfer in a more strategic approach. Using sophisticated software tools for statistical analysis.	Technical innovation and technology transfer is achieved in all the activities/projects undertaken. The process performance is continually improving through incremental and innovative process, and technological improvement. Develop a network system of coalition and partnering with vendors and contractors. Organisation uses sophisticated software tools for both qualitative and quantitative analyses with robust interpretation.
Score	☐	☐	☐	☐	☐
	1. No stable environment to support process. 2. No proven process. 3. No tools and database in place. 4. Unable to repeat success. 5. Project success depends on individual efforts. 1 2 3 4 5	1. Process is evaluated for adherence to descriptions. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Process is controlled and monitored. 1 2 3 4 5	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5	1. Using quantitative approach to understand variation inherent and process outcome. 2. Quality and process performance objectives are established. 3. Using sophisticated tools for both qualitative and quantitative analysis. 4. Capture lessons learned and feedback. 5. Continually improving process performance through incremental and innovative process, and technological improvement. 1 2 3 4 5

Appendix S: Instrument for framework validation

Validation Scoring Sheet

Stakeholder capability enhancement framework for PPP infrastructure projects in Nigeria

Purpose of the Questionnaire

To validate that the stakeholder capability enhancement framework for PPP infrastructure projects in Nigeria is logical, comprehensive, clear, objective, reliable, and practical.

Background

This framework was developed as part of the deliverables of a PhD research study conducted at Northumbria University, Newcastle upon Tyne, United Kingdom by Solomon Olusola Babatunde (Mr).

Your assistance in completing this questionnaire is highly appreciated.

Yours Sincerely

Signed

Solomon Olusola Babatunde
(Research Student)

Information of Respondent

6. Your position in the firm/organisation…….....
7. Name of your organisation……
8. Please state your primary role (i.e. public/private/academic)……..
9. Your highest academic qualification…….
5. How many years of professional experience do you have……

Questionnaire

6. Please select relative score for each validation aspect below to represent the extent of satisfaction. Based on a scale rating 1-5 (where 5 represents "Excellent" and 1represents "Poor").

Validation Aspect	Scoring Scale				
	Poor				Excellent
	1	2	3	4	5
Degree of comprehensiveness					
Degree of objectivity					
Degree of practicality					
Degree of replicability					
Overall reliability					
Overall suitability for stakeholders' organisations involved in PPP projects in Nigeria					

Thanks for your time.

Appendix T: Sample report/or user guide

Sample report/or user guide

For

Stakeholder Organisations Capability Enhancement Framework (SOCEF) in PPP Infrastructure Projects in Nigeria

2015

Introduction

The purpose of the PPP stakeholder organisations capability enhancement framework (SOCEF) user guide/sample report is to communicate directly with the prospective users by providing necessary information regarding PPP projects implementation in Nigeria and on how to use the framework. The framework gives due cognisance to top /key stakeholders in both the public and private sector organisations in PPP projects implementation. Thus, the successful implementation of this framework needs careful consideration of the drivers and barrier of PPP projects implementation, most especially the barriers, which can impinge on stakeholders and framework. Also, as a safeguard to ensure that organisations did not overstay their capabilities when advancing through their capability maturity levels, some criteria are provided. It is on this premise that sample report/user guide is provided in this research. Therefore, prospective stakeholder organisations are implored to use the framework with the guide to enhance the success rate of PPP infrastructure projects in Nigeria. The guide comprises four sections as follows:

Section 1: PPP drivers and barriers

This section introduces the drivers and barriers for implementing PPP infrastructure in Nigeria. It is revealed in this study that there are seventeen drivers for adopting PPPs. These identified drivers through factor analysis were reduced to five major drivers. The five major drivers are: innovation and efficiency gains; strengthening public infrastructure; delivering on time and cost; construction and operational performance; and engender accountability in fund utilisation. The aforementioned drivers are prerequisite/or justifications for pursuing PPP route for infrastructure projects in Nigeria.

This section further details the barriers to PPP projects implementation in Nigeria. For example, successful PPPs are designed taking into consideration the context within which the partnerships will be implemented. Therefore, this study identified sixty-one barriers and through factor analysis the identified barriers were classified into ten principal factors. These include: public and private partners' capacity deficiencies, weak political willingness and administrative bottleneck, weak economic conditions and environmental related problems, social related problems, corruption and inadequate governmental actions in PPPs, low social acceptability, legal and regulatory related problems, poor internal and external stakeholders' relationships, delay and politicization of the concessions, and absence of competition and due diligence. It is evident that the critical success factors (CSFs) that made PPP projects

successful are influenced negatively by these barriers. Thus, the stakeholders in PPP must build-in strategies to eliminate the aforementioned barriers before proceeding with the implementation of PPP projects with a view to achieving successful PPP projects.

Section 2: Maturity module

This section comprises the framework encompassing the stakeholders (both public and private); capability maturity levels definition; and fourteen identified CSFs for PPP projects in Nigeria. The components of the framework are briefly discussed as follows:

Stakeholders: This involves the primary stakeholders from both the public and private sector organisations. The public sector organisation includes public sector authorities including ministries, department, and agencies. While the private sector includes: concessionaires, local lenders/banks, consultants, and contractors.

Capability maturity levels definition: The identified fourteen CSFs were employed for capability maturity levels definition ranging from level 1(Ad hoc) to level 5(Optimising) following Capability Maturity Model (CMM) concept. This user guide informs the stakeholders in assessing capability maturity levels of prospective organisations involved in PPP projects implementation on fourteen CSFs identified in this study.

The identified fourteen CSFs: This comprises the CSFs associated with stakeholder organisations in both public and private sectors. The CSFs are therefore separated into two as follows:

CSFs applicable to stakeholders in public sector

- **Government Involvement by Providing Guarantees (GIPG):** Government involvement is indispensable to launch a PPP project. Thus, governments provide PPP project guarantees in a variety of ways. Guarantees tend to lower the risk taken by the concessionaire, support the cash flows of the concessionaire, and raise the level of confidence of investors and lenders.

- **Political Support (PS):** A positive political attitude from politicians/decision makers toward the private sector involved in an infrastructure projects support the growth of PPP. High-level political support is critical for successful PPP projects, as this would induce confidence in both local and foreign investors.

- **Competitive Procurement Process (CPP):** The quality and value for money (VfM) gains depend on the existence of a competitive bidding process. Thus, government departments should establish key conditions for successful competitive tender and maintained throughout the procurement process.

- **Transparency in the Procurement Process (TPP):** Transparency in the tender process is conducive to the successful implementation of a PPP project. Transparency of process, therefore, requires effective communication that is open as far as possible to public scrutiny.

- **Availability of Suitable and Adequate Financial Market (ASAFM):** This means an availability of an efficient and mature financial market with the benefits of low financing costs and a diversified range of financial products.

- **Project Economic Viability (PEV):** Governments have a monopoly in dispensing PPP projects. Thus, governments need to demonstrate a sure touch in assessing the return that is required by the private sector for taking responsibility for the risk. Therefore, the PPP projects must be economical viable or bankable to attract private investors.

- **Commitment and Responsibility of Public & Private Sectors Commitment (CRPPSC):** This is one of the fundamental principles of partnership. Thus, to secure a successful PPP, all parties have to commit their best resources to the project. Therefore, commitment from both public & private sectors is essential to ensure the attainment of the ultimate goals of the PPP projects.

- **Project Technical Feasibility (PTF):** PPPs have more chances of success when due attention is paid to planning, and a detailed feasibility study has been undertaken. This is important to the private sector for winning a PPP contract. An SPV must demonstrate that the technical aspects of a proposal satisfied all relevant regulatory requirements. Novel technology adds to the riskiness of projects.

- **Appropriate Risk Allocation and Risk Sharing (ARARS):** This means allocating risks to the party best able to manage it. This reduces individual risk premiums and the overall cost of the project because the party in the best position to manage a particular risk should be able to do so at the lowest price. A strategic approach to risk

allocation is, therefore, essential during project development. Thus, to maintain value for money risks should be allocated to the parties best able to manage it.

- **Appropriate Project Identification (API):** PPP does not make a bad project good. Similarly, PPPs do not suit every type of infrastructure investment. Therefore, identification of suitable projects for PPPs is the bedrock for PPP survival.

- **Thorough and Realistic Assessment of the Cost and Benefits (TRACB):** The public and private sectors are concerned with PPP project financial analysis at the project development stage. The assessment of both costs and benefits are derived from forecasts projected. Much of this assessment is treated as commercial-in-confidence. While some forecasts may need to withstand open public scrutiny.

- **Favourable Legal Framework (FLF):** A transparent and stable legal framework that ensures stability in the PPP arrangements and specifies the 'rules of the game' for the participants in PPP projects. Thus, a well-defined legal framework is necessary for PPP projects to prevent corruption.

CSFs applicable to stakeholders in private sector

- **Availability of Suitable and Adequate Financial Market (ASAFM):** This means an availability of an efficient and mature financial market with the benefits of low financing costs and a diversified range of financial products.

- **Project Economic Viability (PEV):** Governments have a monopoly in dispensing PPP projects. Thus, governments need to demonstrate a sure touch in assessing the return that is required by the private sector for taking responsibility for the risk. Therefore, the PPP projects must be economical viable or bankable to attract private investors.

- **Commitment and Responsibility of Public & Private Sectors Commitment (CRPPSC):** This is one of the fundamental principles of partnership. Thus, to secure a successful PPP, all parties have to commit their best resources to the project. Therefore, commitment from both public & private sectors is essential to ensure the attainment of the ultimate goals of the PPP projects.

- **Project Technical Feasibility (PTF):** PPPs have more chances of success when due attention is paid to planning, and a detailed feasibility study has been undertaken. This is important to the private sector for winning a PPP contract. An SPV must demonstrate that the technical aspects of a proposal satisfied all relevant regulatory requirements. Novel technology adds to the riskiness of projects.

- **Appropriate Risk Allocation and Risk Sharing (ARARS):** This means allocating risks to the party best able to manage it. A strategic approach to risk allocation is, therefore, essential during project development. Thus, to maintain value for money risks should be allocated to the parties best able to manage it.

- **Technical Innovation and Technology Transfer (TITT):** The expertise and experience of the private sector encourages innovation, results not only in reduced costs, shorter delivery times and improvement in the functional design, construction processes but also better facility management and operational processes.

- **Thorough and Realistic Assessment of the Cost and Benefits (TRACB):** The public and private sectors are concerned with PPP project financial analysis at the project development stage. The assessment of both costs and benefits are derived from forecasts projected. Much of this assessment is treated as commercial-in-confidence. While some forecasts may need to withstand open public scrutiny.

- **Strong and Good Private Consortium (SGPC):** This is mainly large and well-established construction companies that have won PPP project. The private companies are wishing to participate in PPP market, where appropriate, join to form consortia capable of synergising and exploiting their individual strengths.

Section 3: Criteria to safeguard organisations when advancing through their capability maturity levels

The following criteria are provided as a guide to ensure that organisations are not overstayed when advancing through their capability maturity levels. The criteria are as follows:

- Organisations seeking to move from capability maturity level 1 to level 2 should establish a more disciplined process and a process group.

- Organisations advancing from level 2 to level 3 must have in place: (i) policies and plans that indicated the organisation will perform the process; and (ii) the organisation has been disciplined by establishing sound project management.
- Organisations moving from level 3 to level 4 must have demonstrated: (i) organisational standard process exists that associated with that process area; (ii) the processes in the organisation are more consistently defined and applied because they are based on organisational standard processes.
- Organisations seeking to move from level 4 to level 5 must have exhibited: (i) organisation focused on performance improvement of processes by using statistical and other quantitative techniques to improve organisational and project processes; (ii) organisation focused on understanding and controlling performance at the sub-process level and using the results to manage projects, and predictions are based in part, on a statistical analysis.
- Organisations in level 5 should be demonstrating: (i) continuous wide performance management and process improvement by using both qualitative and quantitative data to make decisions.

Section 4: Assessment tool for the framework

In order to use the framework to assess the stakeholder organisations current capability maturity level on the identified 14 CSFs, a capability maturity level between 1-5, where 1 = ad hoc and 5= optimizing was provided in the framework. Consequently, within a particular capability maturity level (i.e.1-5), an identified factors characteristics were provided, which were used as the criteria for the rating with respect to each CSF in the framework. In this regard, a scale rating 1-5 was developed to rate the extent the stakeholder organisations have gone into a particular capability maturity level they belong. Thus, the quantitative assessment was considered as a support tool for making an overall assessment of both the public and private organisations current capability maturity levels and for comparison approach. Sample portion of assessment tool is provided on the next page.

Sample portion of assessment tool for the framework

CSFs	Capability maturity levels				Stakeholder: Public sector authorities (including ministries, departments, agencies and local authorities)
	1 Ad hoc	2 Repeatable	3 Defined	4 Managed	5 Optimizing
Project identification	No formal process for PPP projects identification. Project identification success depends on individual efforts.	Project identification process is developed. Process is planned and executed in accordance with policy. Trainings are provided and repeated.	Standard process and procedures for project identification are established. Standard process is used to establish consistency across the organisation. Process is more rigorous and managed proactively. Tools and database are in place.	Tools and database enable strategic analysis of project identification. Predictions are based in part, on a statistical analysis. Performance reporting.	Appropriate project identification is achieved. Standard process and procedures are continuously improved. Processes are kept up to date, seizing opportunities when circumstances change.
Score		2.60			
	1. No proven process. 2. Process is chaotic. 3. Unable to repeat success. 4. Process group to bootstrap the process is established. 5. Project success depends on individual efforts. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. There is plan for performing the process. 2. Resources are provided. 3. Responsibilities are assigned. 4. Relevant stakeholders are involved. 5. Trainings are provided. 1 2 3 4 5 ✓ ☐ ✓ ✓ ☐	1. Process is characterised and understood. 2. Standard process is established. 3. Process is improved over time. 4. Process is more consistently defined. 5. Tools and database are in place. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Means for improvement are established. 2. Tools and database are in use for statistical analysis. 3. Predictability of the process using statistical analysis. 4. Process is regularly and formally reviewed with input from other stakeholders. 5. Strong teamwork, even with external partners. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐	1. Quality and process performance objectives are established. 2. Capture lessons learned and feedback. 3. Continually improving process performance through innovative process and technological improvement. 4. Strong project driven and flexible. 5. Leverage good relationship with other stakeholders. 1 2 3 4 5 ☐ ☐ ☐ ☐ ☐

Note: Details provided in Appendix Q & R

The steps to be followed in using the assessment tool for the framework are as follows:

Step 1: There are two scoring levels namely: main level and sub-level in each of the five capability maturity levels (i.e. level 1- Ad hoc to level 5- Optimising).

Step 2a: Using the capability maturity level definitions in the main level ((i.e. level 1- Ad hoc to level 5- Optimising), tick only one level that best describe your organisation.

Step 2b: Out of the five factors (sub-level) listed within the level selected in 2a, identify as many as possible that best describe your organisation. Each of the five factor listed within each level weighs 0.2. Thus, the maximum score obtainable is 1.

Step 3: Multiply the number of factor(s) selected in step 2b by 0.2

Step 4: Add the resultant score in step 2a (i.e. 1-5) and resultant value in step 3

Step 5: The value obtained in step 4 is the current capability maturity level of the organisation on that particular critical success factors (CSF) in the framework.

Step 6: Repeat step 1-5 for all the CSFs applicable to your organisation in the framework.

Worked example:

As indicated in the sample portion of assessment tool above:

The organisation has satisfied three assessment criteria out of five sub-level factors in maturity level 2. Thus, 3 x 0.2 = 0.6

Then, 2 (i.e. maturity level 2, which is Repeatable) + 0.6 = 2.60

Hence, the current capability maturity level of organisation with respect to that CSF (which is project identification) is 2.60

See Table 8.5, Section 8.6 of Chapter 8 for the results of current capability maturity levels for both the public and private sector organisations in the six PPP case studies examined.